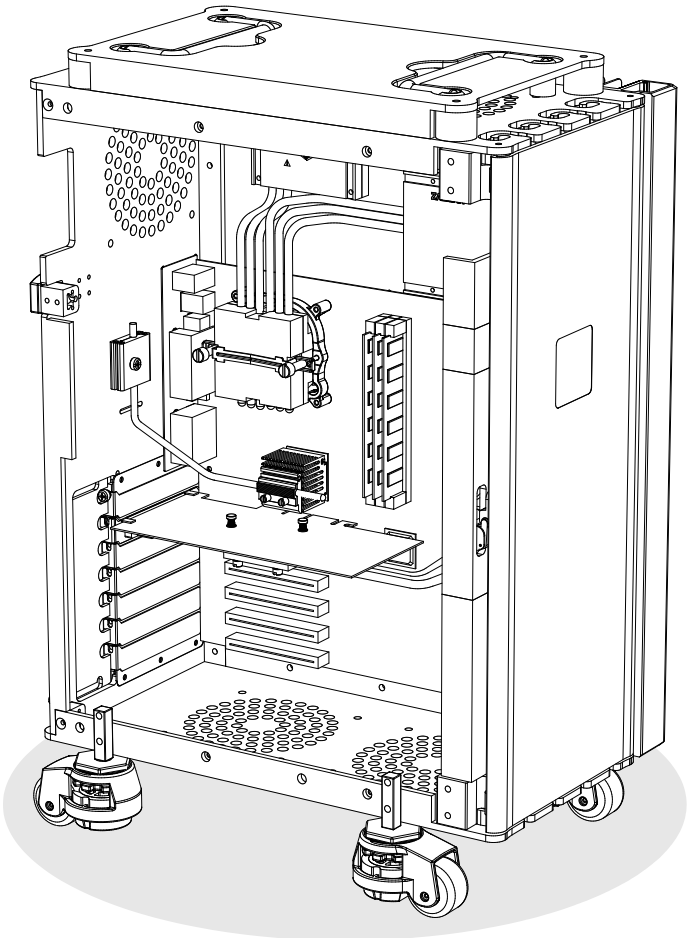
ZALMAN
Zalman Tech Co., Ltd.

User's Manual

Version 1.1

Totally No Noise Computer Case

TNN 500AF



ENGLISH

한 글

※ For other language versions please visit our website.

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English

English Edition

◈ **Please read before installation.**

◈ **Visit our website and watch the TNN500AF installation video first to make your installation easier.**

www.zalman.co.kr www.zalmanusa.com

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English

Welcome

Congratulations on your purchase of ZALMAN Tech's TNN 500AF. With TNN500AF, you are now in the world of silent computing. TNN 500AF is the ultimate answer to every computer user's dream of creating a silent computing environment with total system stability.

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1 Safety Notices

1) Keep this unit away from heat sources and direct sunlight.
2) This unit should be placed on a flat, level, and solid surface.
3) Always shut down the operating system and switch the AC OFF before disassembling.
4) Keep this unit in an upright position when the AC power is ON.
5) Do not place or spill liquids on this unit.
6) Avoid inserting any objects into the system while it is ON.
7) Lower the caster stops to immobilize the unit before using the system.
8) If this unit is to be transported a long distance, place it in the original packing box or a custom made hard case.
9) Do not drop or expose this unit to shock while it is in transit.
10) Store and use out of the reach of children.
11) Check the condition of the product and its components before installation.
If there is a problem with the product and/or its components, please contact the Retailer immediately.

◈ Disclaimer

Zalman Tech Co., Ltd. is not responsible for any damages due to external causes, including but not limited to, improper use, problems with electrical power, accident, neglect, alteration, repair, improper installation, or improper testing.

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2 Features

TNN 500AF is the world's first truly noiseless high-end computer case, developed with heatpipe technology, HSC (Heat Source Contact) power technology, High Capacity Extrusion technique, and FMS (Flexible Mounting Structure) design technology by ZALMAN Tech Co., Ltd.

The TNN 500AF package contains a high performance aluminum computer case with an absolutely noiseless cooling solution for the CPU, VGA Card, Power Supply, and Northbridge free of fans, making it ideal for storage servers, workstations, high-end home systems, and sound studio computer systems.

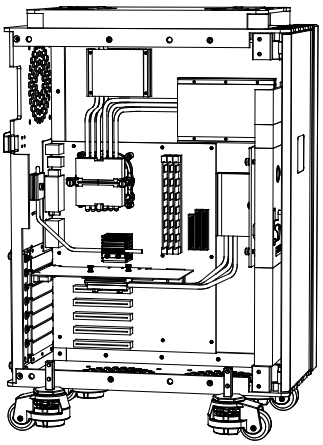
1) Complete Silence

The cooling system does not generate any noise because it does not utilize any fans. Even the HDD noise is blocked out by the sturdy aluminum plates 5 to 7mm thick, achieving completely silent computing.

2) Stability

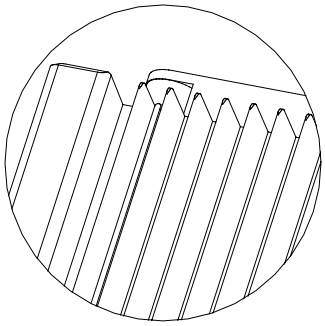
① No Fans in the System

The majority of heat generated inside the system is transferred through heatpipes to the heatsink plates where it is dissipated via natural convection, reducing inflow of dust dramatically. Consequently, this prevents system crashes caused by dust buildup and fan failures (fans last around 20,000 to 50,000 hours).



② High-Capacity Aluminum Heatsink Plates for Natural Convection

Two large aluminum heatsink plates cool heat generating components, such as the CPU and VGA Chipset, through natural convection. Without any moving parts, the TNN 500AF is virtually free of the need for mechanical maintenance, and it is 100% recyclable, making it environmentally friendly.



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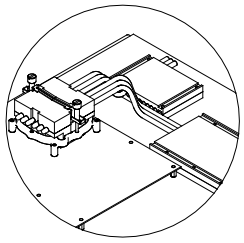
③ Heat Transfer via Heatpipes

Virtually ever-lasting heatpipes transfer heat away from the CPU, VGA chipset, and Northbridge chipset preventing system crashes due to overheating.

- **CPU Heatpipes**

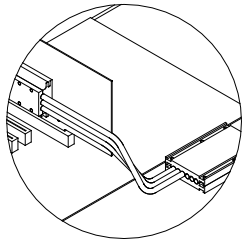
Heat from the CPU is transferred to the heatsink plate through 6 heatpipes each 6 millimeters in diameter. The six heatpipes can transfer up to 150W of heat from the CPU - sufficient for the hottest CPUs on the market. The CPU Block Base is made of pure copper to ensure the highest cooling performance.



CPU Heatpipes

- **VGA Card Heatpipes**

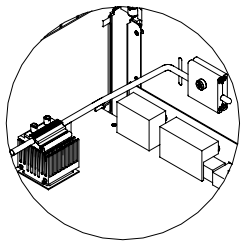
Heat from the VGA Card is transferred to the heatsink plate through 3 heatpipes each 6 millimeters in diameter. The three heatpipes can transfer up to 75W of heat from the VGA chipset - sufficient for the hottest VGA cards on the market.



VGA Card Heatpipes

- **Northbridge Heatpipe**

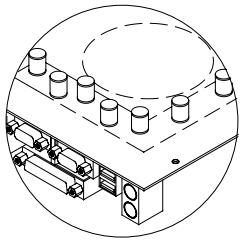
Heat from the Northbridge chipset is transferred to the heatsink plate through a single heatpipe, 5 millimeters in diameter. This heatpipe can transfer up to 20W of heat.



Northbridge Heatpipe

④ Heat Transfer via Rear-mount Thermal Blocks

When the Rear-mount Thermal Blocks are installed on the back-side of the motherboard in line with the position of the FETs (Field Effect Transistor) and the Northbridge chipset, each can lower the FET temperature by 10 to 30°C and the Northbridge chipset by 5 to 10°C.



Rear-mount Thermal Blocks

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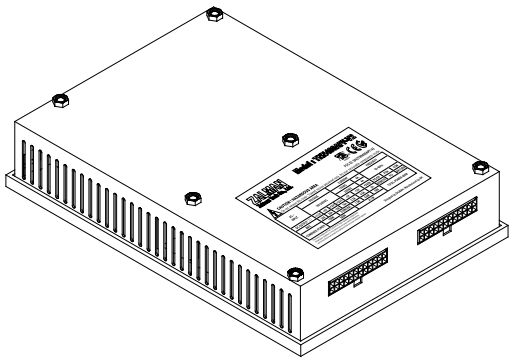
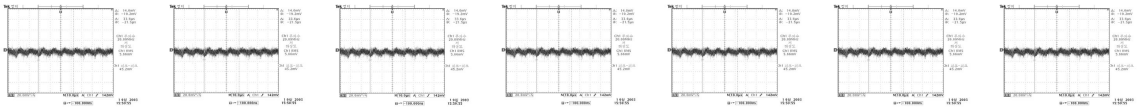
⑤ High-Efficiency, Fanless Power Supply



The power supply uses high-efficiency FET components and Heat Source Contact (HSC) technology, eliminating the need for a fan, and has a 10% higher power conversion efficiency (80%) rating than conventional power supplies. Heat from the power supply is transferred directly to the high-capacity heatsink plates, where it is dissipated by natural convection, making the power supply free of noise and vibration.

- High-capacity active PFC inductors, separate switching transformers for each power rail (+12V, +5V, +3.3V), and 2-FET forward converter design all work to create a superior level of stable power quality.
- Conventional power supplies tend to have lower output voltage due to line-dropping phenomenon. The TNN Power Supply extends the output voltage sensors up to the motherboard connection for +3.3V, +5V, and +12V rails to prevent this, enhancing output voltage accuracy and assuring system stability.

■ **Ripple and noise waveforms at DC output**



a)+5VDC (21.4mVp-p)	b)+3.3VDC (42.2mVp-p)	c)+12V1DC (80.8mVp-p)	d)+12V2DC (88.4mVp-p)	e)-12VDC (98.4mVp-p)	f)-5VDC (56mVp-p)	g)+5VsdDC (31.8mVp-p)

※ Data above were measured according to INTEL ATX v2.03/ATX12V power supply specs.

Measurement specifications : For each DC output, a bypass made up of one 0.1μF ceramic capacitor and one 10μF electrolytic capacitor is connected and measured with an oscilloscope (input impedance 1MΩ) at a frequency bandwidth of 20MHz. The waveforms may differ under different measurement conditions.

3) Electricity Conservation

Since TNN 500AF is equipped with a high-efficiency power supply and does not use any fans, it utilizes 10 to 15% less power compared to a conventional computer system under the same configuration.

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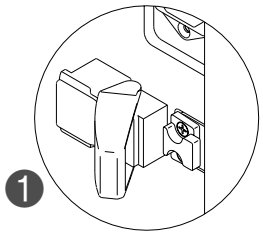
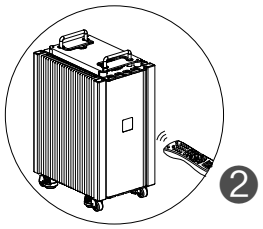
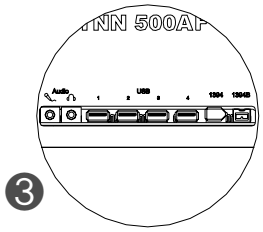
4) Ease of Use



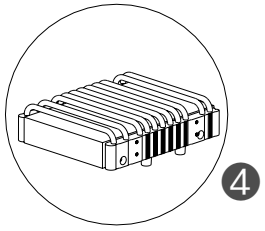
① A latch is installed to prevent component theft.



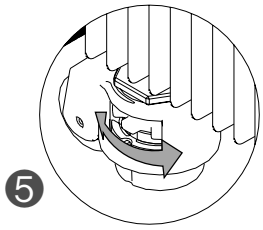
② The Remote Control enables the user to conveniently experience multimedia content and control the PC.



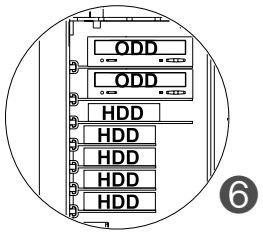
③Various I/O ports are provided.
(Audio, USB, IEEE-1394, 1394B)



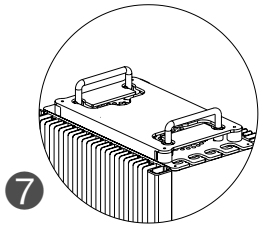
④ Heatpipe HDD Cooler dissipates heat from the hard disk and reduces vibration transferred to the case.



⑤ Four casters (wheels) withstand up to four metric tons of weight in total, and have skid prevention / height adjustment features built in.



⑥ The case is structured to easily house up to two ODDs and five HDDs.

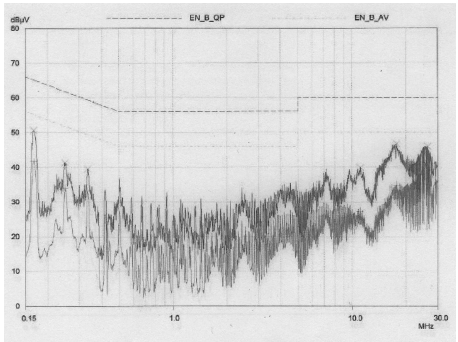


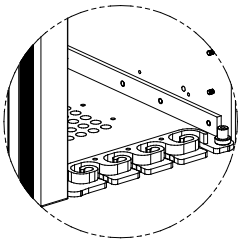
⑦ Retractable handles are attached for short-range transportation.

5) Shielding from EMI (Electro-Magnetic Interference)

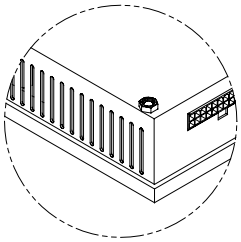
The sturdy, thick (5 to 7mm) aluminum case and the EMI Interception Block effectively contain EMI. Even the power supply housing is designed with EMI shielding.

EMI Measurement Data Graphs





EMI Interception Block



EMI Interception Design

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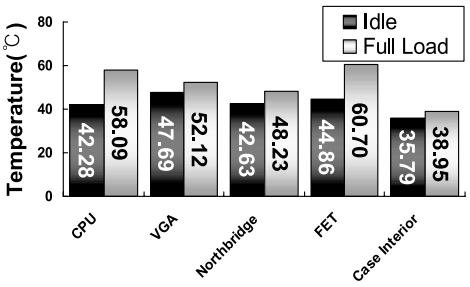
※ Test Results

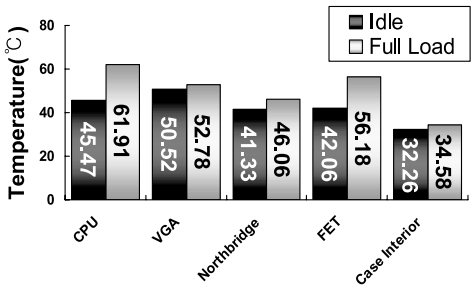
▶ AMD AMD64 Athlon64 System

① Thermal Test (Room Temperature : 28℃)

	Component	TNN 500AF AMD System Temperature(℃)		Conventional AMD System Temperature(℃)		Notes
		Idle	Full Load	Idle	Full Load	
1	CPU	42.28	58.09	45.47	61.91	Daq/56
2	VGA	47.69	52.12	50.52	52.78	Daq/56
3	Northbridge	42.63	48.23	41.33	46.06	Daq/56
4	FET (Arround CPU)	44.86	60.70	42.06	56.18	Daq/56
5	Case Interior	35.79	38.95	32.26	34.58	Daq/56



TNN 500AF AMD System

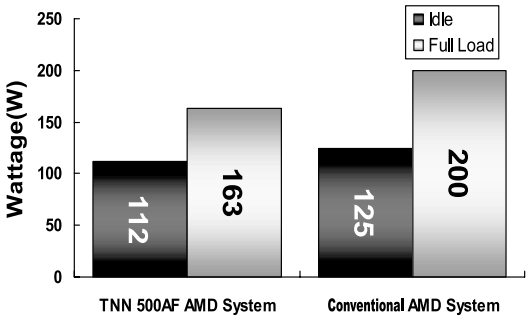


Conventional AMD System

※ Fan Speed at Full Load

Fan Position	TNN 500AF AMD System (rpm)	Conventional AMD System (rpm)
CPU Cooler	0(Fanless)	5094
VGA Cooler	0(Fanless)	4463
Northbridge Cooler	0(Fanless)	0(Fanless)
Exhaust Fan	0(Fanless)	1600

② Power Consumption Test



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③ Configuration of Systems for Testing

	TNN 500A AMD System	Conventional AMD System
Case	TNN 500AF	Micronics TH1000
CPU	AMD Athlon 64 3500+	
CPU Cooler	Fanless Heatpipe CPU Cooler	AMD Stock CPU Cooler
Motherboard	ASUS A8V Deluxe (939)	
HDD	Seagate Barracuda 80G (7200rpm)	
ODD	Samsung Combo 52X	
RAM	Two (2) Samsung DDR2 256MB (PC3200)	
VGA Card	Unitech ATI Radeon 9800 Pro 128MB	
VGA Card Cooler	Fanless Heatpipe VGA Cooler & RAM Heatsink	Unitech Stock VGA Cooler
Northbridge Cooler	Fanless Heatpipe Northbridge Cooler & Rear-mount Thermal Blocks	Intel Stock Northbridge Cooler
Power Supply	Fanless TNN400APF-V2(400W)	Zalman ZM400B-APS
Exhaust Fan	None	Zalman ZM-F2

④ Testing Equipment and Programs

▣ CPU Loading Program
CPU Burn (High)

▣ Measurement Instrument
Personal Daq/56 (Iotech, Inc.) KIKUSUI PCR 1000L

▣ Temperature Measurement Program
DaqView (Iotech, Inc.)

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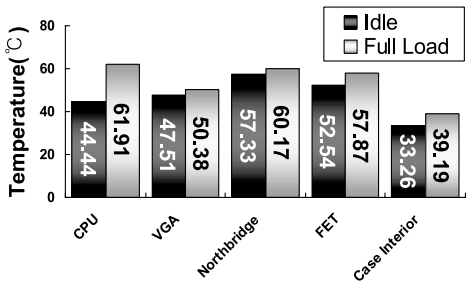
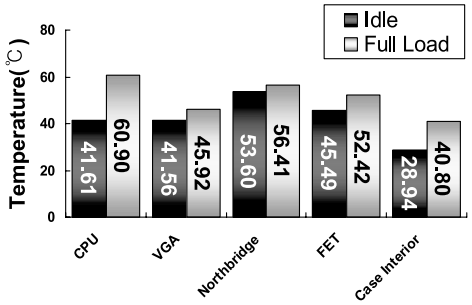
▶ Intel P4 Prescott System

① Thermal Test (Room Temperature : 25℃)

	Component	TNN 500AF Intel System Temperature(℃)		Conventional Intel System Temperature(℃)		Notes
		Idle	Full Load	Idle	Full Load	
1	CPU	44.44	61.91	41.61	60.90	Daq/56
2	VGA	47.51	50.38	41.56	45.92	Daq/56
3	Northbridge	57.33	60.17	53.60	56.41	Daq/56
4	FET (Arround CPU)	52.54	57.87	45.49	52.42	Daq/56
5	Case Interior	33.26	39.19	28.94	40.80	Daq/56



TNN 500AF Intel System

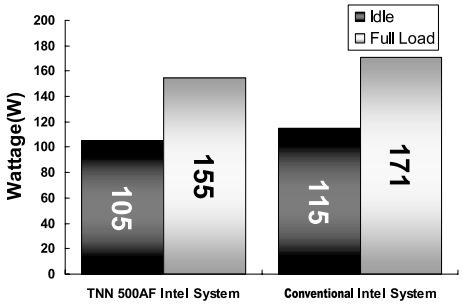


Conventional Intel System

※ Fan Speed at Full Load

Fan Position	TNN 500AF Intel System (rpm)	Conventional Intel System (rpm)
CPU Cooler	0(Fanless)	4600
VGA Cooler	0(Fanless)	6405
Northbridge Cooler	0(Fanless)	0(Fanless)
Exhaust Fan	0(Fanless)	1600

② Power Consumption Test



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③ Configuration of Systems for Testing

	TNN 500AF Intel System	Conventional Intel System
Case	TNN 500AF	Micronics TH1000
CPU	Intel Prescott 520	
CPU Cooler	Fanless Heatpipe CPU Cooler	Intel Stock CPU Cooler
Motherboard	Intel D925XCV (LGA 775)	
HDD	Seagate Barracuda 80G (7200rpm)	
ODD	Samsung Combo 52X (TS-H492A)	
RAM	Two (2) Samsung DDR2 256MB (PC4200)	
VGA Card	Bytel ATI Radeon X800 XT 256MB	
VGA Card Cooler	Fanless Heatpipe VGA Cooler & RAM Heatsink	Bytel Stock VGA Cooler
Northbridge Cooler	Fanless Heatpipe Northbridge Cooler & Rear-mount Thermal Blocks	Intel Stock Northbridge Cooler
Power Supply	Fanless TNN400APF-V2(400W)	Zalman ZM400B-APS
Exhaust Fan	None	Zalman ZM-F2

④ Testing Equipment and Programs

▣ CPU Loading Program
Maximum Power Program for the Prescott Processor Rev. 1.2

▣ Measurement Instrument
Personal Daq/56 (Iotech, Inc.) KIKUSUI PCR 1000L

▣ Temperature Measurement Program
DaqView (Iotech, Inc.)

※ Caution

1) If the CPU has a higher Thermal Design Power (TDP) rating than an Intel Prescott or an AMD Athlon64 3500+, the Heatpipe Northbridge Cooler and a Rear-mount Thermal Blocks (ZM-RTB1) MUST be installed to cool the Northbridge.

2) To use CPUs with a 100W or higher TDP rating, Rear-mount thermal Blocks Must be installed (one for each FET) on the backside of the motherboard in-line with each FET.

3 Patents

◈ Korean Patent Application #04-82817
◈ Korean Patent Application #03-30358
◈ Korean Design Registration #347413
◈ International patent applications pending in the EU, USA, Japan and 30+ other countries

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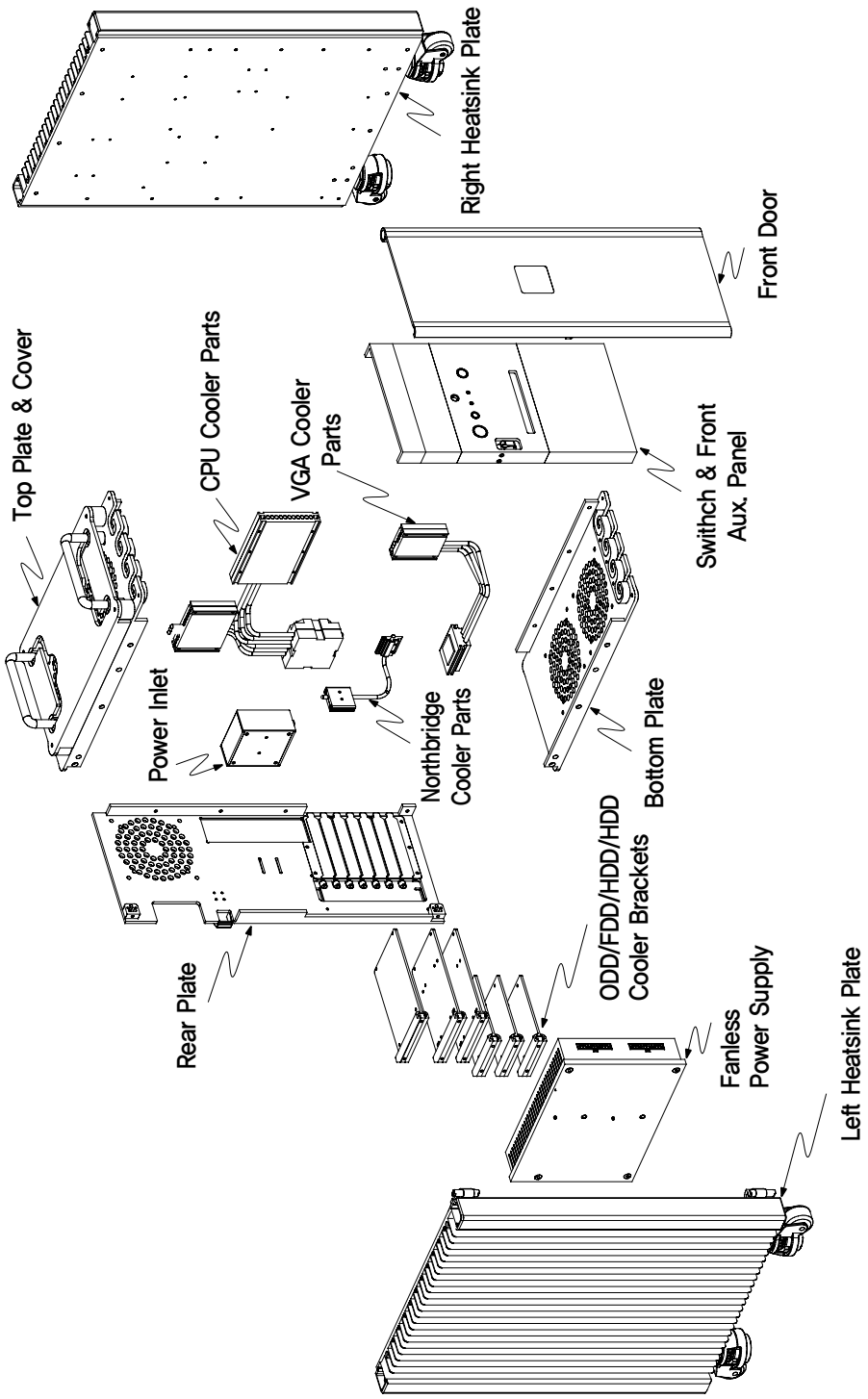
4 Components



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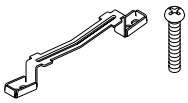
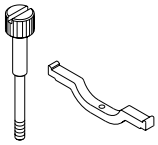
1) Heatpipe CPU Cooler Parts [One(1) Bag]

1) Components for Intel Pentium 4 (Socket 478)



One (1) Socket 478 CPU Clip

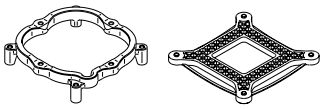
Four(4) PH M4X22 bolts



Two (2) Socket 478 Finger Bolts (M3X52)

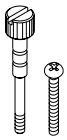
Two (2) Socket 478 Clip Supports

2) Components for Intel Pentium 4 (Socket 775)



One(1) Socket 775 Clip Support

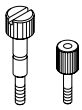
One(1) Socket 775 Back Plate



Two (2) Socket 775 Finger Bolts (M3X49)

Four (4) PH M3X22 Bolts

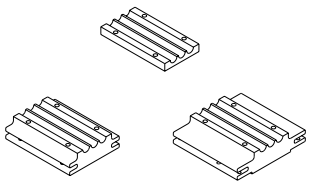
3) Components for AMD64 (Socket 754/939/940)



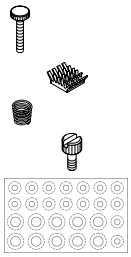
Two (2) AMD64 Finger Bolts (#6-32X40)

Two (2) AMD64 Nipples

2) Heatpipe VGA Cooler Parts [One(1) Bag]



VGA Block Base A/B & Cover [one(1) Each]



Four (4) VGA Finger Bolts A (M2.5)

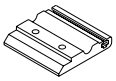
Eight (8) Ram Heatsinks

Four (4) VGA Springs

Four (4) VGA Finger Bolts B (M3)

Paper Washers

3) Heatpipe Northbridge Cooler Parts [One(1) Bag]



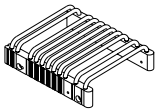
Block Base

Block Cover

Thermal Pad

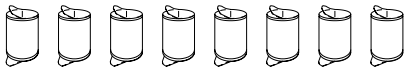
Two (2) Common Finger Bolts

4) Heatpipe HDD Cooler



One (1) ZM-2HC2 Set

5) Rear-mount Thermal Blocks



One(1) ZM-RTB1 Set (8 Blocks)

6) HDD/HDD Cooler Set [One(1) Bag]

Five (5) Ground Wires

Twenty Four (24) FH #6-32X7 Bolts

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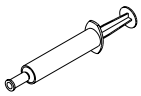
7) ODD/FDD Bolts [One(1) Bag]

Twelve (12) PH M3X10 Bolts

8) Motherboard Bolts [One(1) Bag]

Ten (10) PWH M3X5 Bolts

9) Thermal Grease

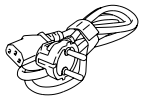


2.5 ml

10) ATA 133 Cable [One(1) Bag]

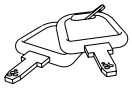
One (1) ATA 133 Cable

11) Power Cord [One(1) Bag]



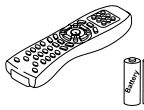
One (1) Power Cord

12) Latch Key [One(1) Bag]



Two (2) Latch Keys

13) Remote Control Set



One(1) Remote Control

Two(2) AAA Batteries

One(1)

Installation CD

One(1) iMON & Multi-Median

User's Guide

14) Motherboard Power Cable [One(1) Bag]

One(1) Motherboard Power Cable

(24 pin -> 20pin)

15) TNN 500AF User's Guide (1Copy)

One(1) TNN 500AF

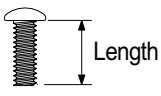
User's Guide

16) Spare Parts [One(1) Bag]

※ Interpreting the Bolt Abbreviations

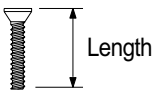
PH M4X20 : PH(Pan Head) Type, Meter Screw, 4mm in Diameter, 20mm in Length

FH #6-32X8 : FH(Flat Head) Type, Screw #6, 32 Pitches per Inch, 8mm in Length

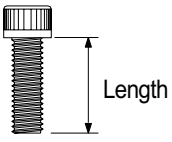


Pan Head

Pan-Washer Head



Flat Head



Socket Head

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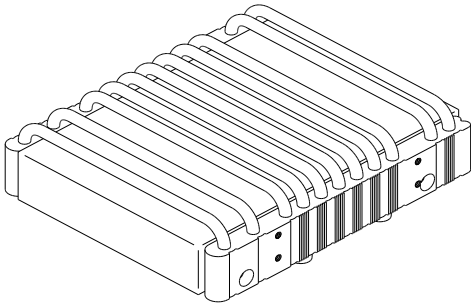
5 Optional Components

Heatpipe HDD Cooler (ZM-2HC2)



6 Specifications

1) Model : TNN 500AF
2) Dimensions : 400(L) x 286(W) x 597(H) mm
3) Weight : 26Kg
4) Compatible CPUs : All Intel Pentium 4 CPUs and AMD AMD64 CPUs Supported

※ **NOTE** : When the Thermal Design Power rating of the CPU is 100W or higher, a quiet 120mm case fan MUST be installed and operated at 1000~1200rpm, and Rear-mount Thermal Blocks (ZM-RTB1) must be installed on the backside of the motherboard. Refer to page 22.

1) CPUs that require a quiet case fan and Rear-mount Thermal Blocks (ZM-RTB1) **(As of Oct. 30, 2004)**

CPU		Socket	TDP
Intel Pentium 4	Prescott 3.2E GHz	478	103W
	Prescott 550 (3.2 GHz)	775	115W
AMD AMD64	Athlon 64 FX 55 (2.6 GHz)	939	104W

(※ Before using one of the latest CPUs, check our website for usage guidelines and information regarding compatibility.)

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2) CPUs with Thermal Design Power ratings under 100W. **(As of Oct. 30, 2004)**

CPU		Socket	TDP
Intel Pentium 4	Northwood 3.4 GHz	478	89W
	Prescott 3.0E GHz	478	89W
	Prescott 540 (3.2 GHz)	775	84W
AMD AMD64	Athlon 64 4000 + (2.4 GHz)	754 939 940	89W
	Athlon 64 FX 53 (2.4 GHz)		89W
	Opteron 250 (2.4 GHz)		89W

(All CPUs that are slower than those mentioned above have Thermal Design Power ratings under 100W.)

3. Refer to the following website for more information regarding CPU compatibility. (www.zalman.co.kr/product/TNN500AF.html)

5) Compatible VGA Cards

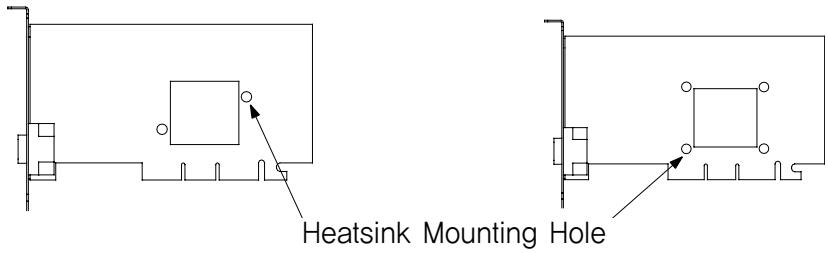
All AGP / PCI Express VGA cards that have heatsink mounting holes

(As of Oct. 30, 2004)

Manufacturer	Model
ATI	Up to X 800 XT
NVIDIA	Up to GeForce 6800
Matrox	All Parhelia Series

※ Notes

1. NVIDIA PCX Series VGA Cards are not supported. Replace with a Zalman-recommended VGA card.
2. If the VGA card does not install normally due to physical incompatibility with the case, stop installation and replace with a Zalman-recommended VGA card listed on the following website. (www.zalman.co.kr/product/TNN500AF)



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6) Thermal Transfer Capacity

① CPU Heatpipe (ZMC-6HB) : 150W

② VGA Card Heatpipe (ZMV-3HA) : 75W

③ Northbridge Heatpipe (ZMN-1HB) : 20W

7) Power Supply Output Capacity : 400W

8) Power Supply Electrical Specifications (Model : TNN400APF - V2)

AC Input Range	Voltage	100VAC ~ 240VAC ±10%
	Frequency	50Hz~60Hz
AC Input Current (Sustained)	115VAC	8A
	230VAC	4A
Inrush Current Limit (@ 25℃ Cold Run)	115VAC	70A
	230VAC	50A
Efficiency	80% @ 230VAC (Full Load)	

Output	Load Range			Combined Power	
	Imin	Imax	Ipeak		
+3.3VDC	1A	20A	27A	180W	380W
+5VDC	2A	20A	26A		
+12V1DC	1A	18A		216W	
+12V2DC	0A	16A			
-12VDC	0.0A	0.8A		21.1W	
-5VDC	0.0A	0.3A			
+5VSB	0.0A	2A	2.5A		
TOTAL				400W	

DC Output Voltage Stability Parameters	Output	Stable Range	Under Full Load
	+5VSB	±5% (+4.75V ~ +5.25V)	
	+3.3VDC	±5% (+3.14V ~ +3.45V)	
	+5VDC	±5% (+4.75V ~ +5.25V)	
	+12V1DC	±5% (+11.4V ~ +12.6V)	
	12V2DC	±5% (+11.4V ~ +12.6V)	
	-12VDC	±10% (-10.8V ~ -13.2V)	
	-5VDC	±10% (-4.50V ~ -5.50V)	

DC Output Ripple & Noise Parameters	Output	Nominal Range	Under Full Load
	+5VSB	80mV	
	+3.3VDC	80mV	
	+5VDC	80mV	
	+12VDC	120mV	
	+12VDC	120mV	
	-12VDC	120mV	
	-5VDC	100mV	

Protections
Over-Voltage Protection (OVP)
Over-Current Protection (OCP)
Under-Voltage Protection (UVP)
Short Circuit Protection(SCP)
EMC(EMI & EMS)
FCC Part 15 Class 'B',CISPR22 Class'B'
UL, CE, MIC

List of compatible motherboards, HDDs, and ODDs for building a TNN 500AF system is available at the following website (www.zalman.co.kr/product/TNN500AF.html).

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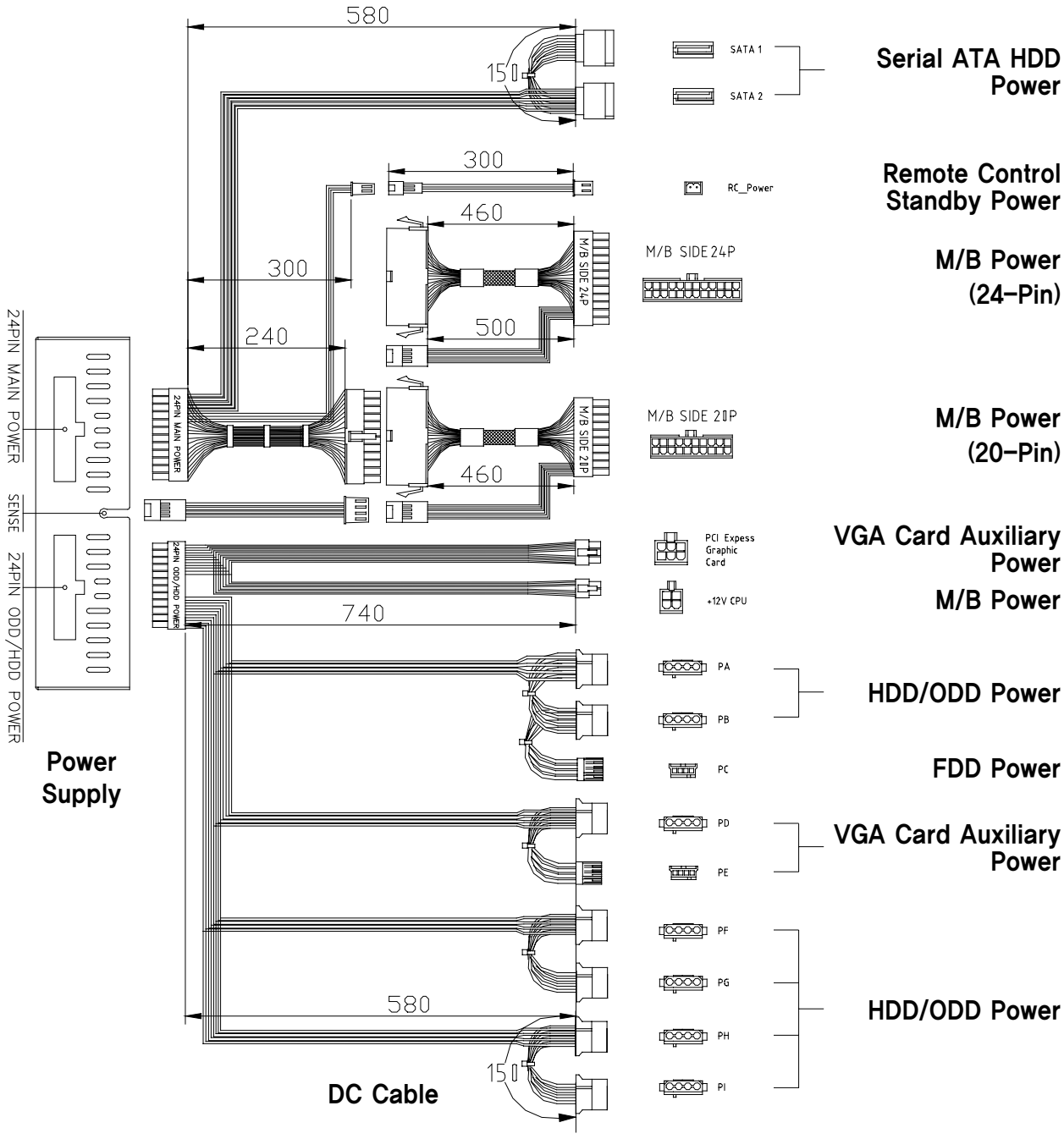
9) Output Power Cable



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7 Operational Notes

1) Operating Environment

Recommended Room Temperature : 15~25℃

Operation in comfortable room temperature is recommended.

2) Precautionary Notes on Booting

When booting the computer, it may automatically power down after an alarm sound is generated to indicate that the rotation of the CPU fan is slow by a system monitoring program. If this happens, connect the fan on the stock CPU Cooler to the 3-pin connector for the CPU Cooler on your motherboard. Boot the system and set "CPU Fan Detected" to "Disabled" in the BIOS settings. Turn the system off, remove the CPU Cooler fan, and reboot.

NOTES)

1. Some motherboards do not boot if the rotation of the CPU fan is not detected. There might not be a "CPU Fan Detected" setting in the BIOS setup, but updating the BIOS could solve this problem. For more information on updating the BIOS, please refer to your motherboard manufacturer's website.
2. When using an Intel motherboard, if you remove the motherboard from an existing system and attach it to the TNN 500AF, the system's Active Monitor may generate an alarm sound with a warning that there is no CPU fan. Remove Active Monitor from Add/Remove Programs applet in Control Panel and reinstall.

3) Compatible Components

A list of compatible components for building a TNN 500AF system is available at the following website (www.zalman.co.kr/product/TNN500AF.html).

※ NOTE

Only use motherboards recommended by Zalman.
[Certain motherboards have unusually high power consumption and/or are not compatible with the Rear-mount Thermal Blocks(ZM-RTB1).
Refer to Page 22.]

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8 Installation Guide

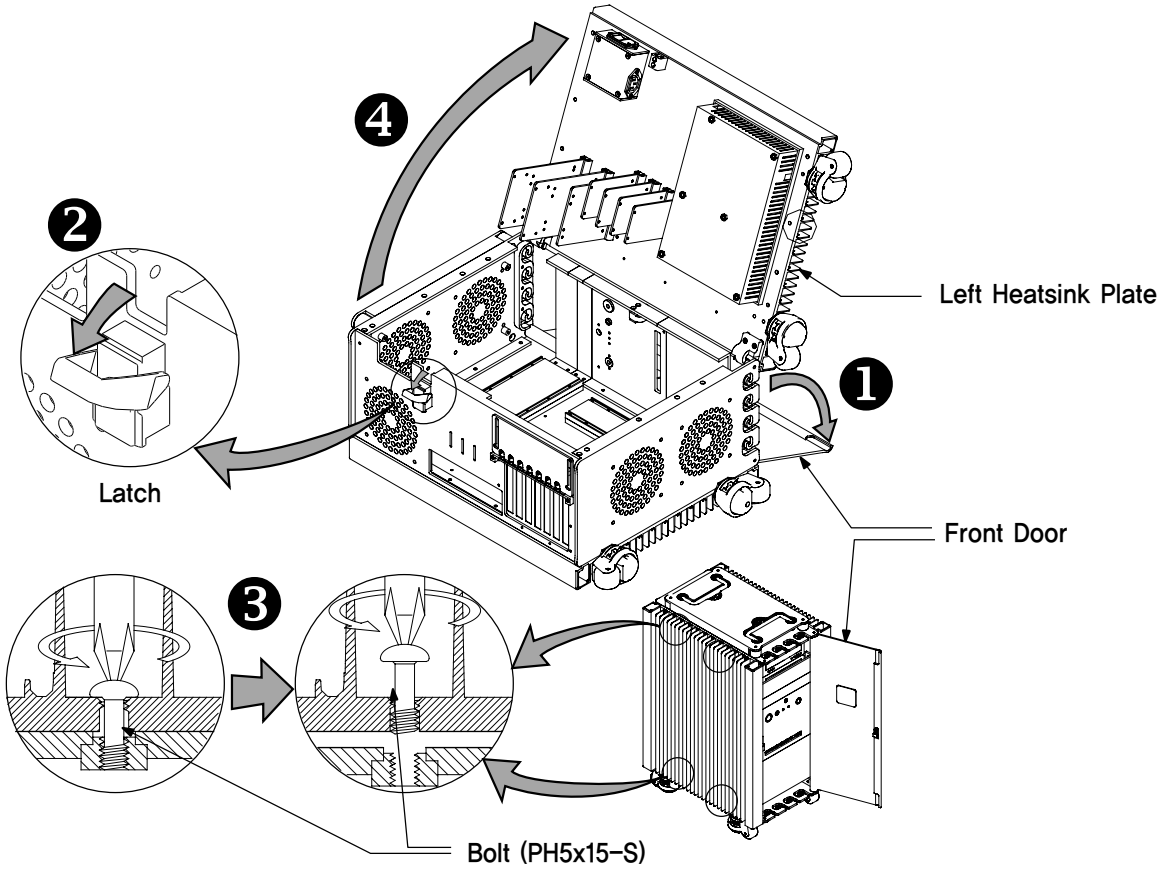
1) Opening and Disassembling the TNN500AF Case

① As shown in the diagram, lay the TNN500AF down on a flat surface and open the front door.

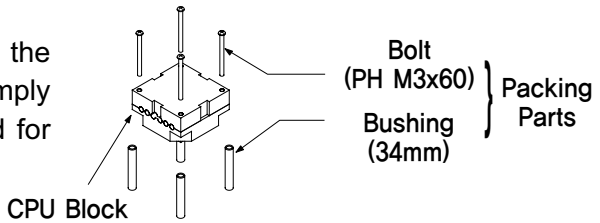
② Open the latch with the key.

③ Unscrew four bolts (PH M5x15-S) on the Left Heatsink Plate and open the plate as shown.

④ Remove the blocks and Heatpipes in an orderly fashion using a screwdriver and store them in a safe place.



The Bushings and the bolts separated at the time of the CPU Block's removal are simply for packaging purposes and are not used for the actual assembly of the system.



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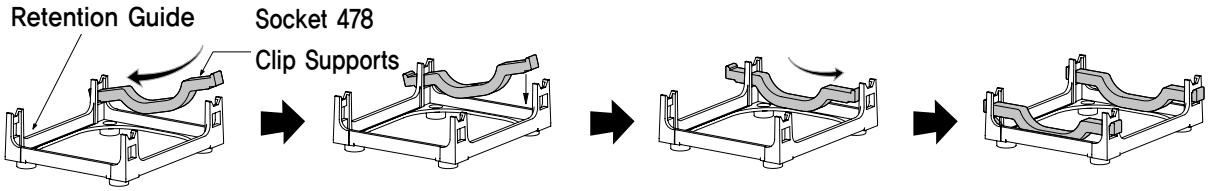
2) Installing the CPU Clip Support and Motherboard

① Choose the correct Clip Support & bolts for the CPU type being used.

▶ **For Intel Pentium 4 Socket 478 Motherboards**

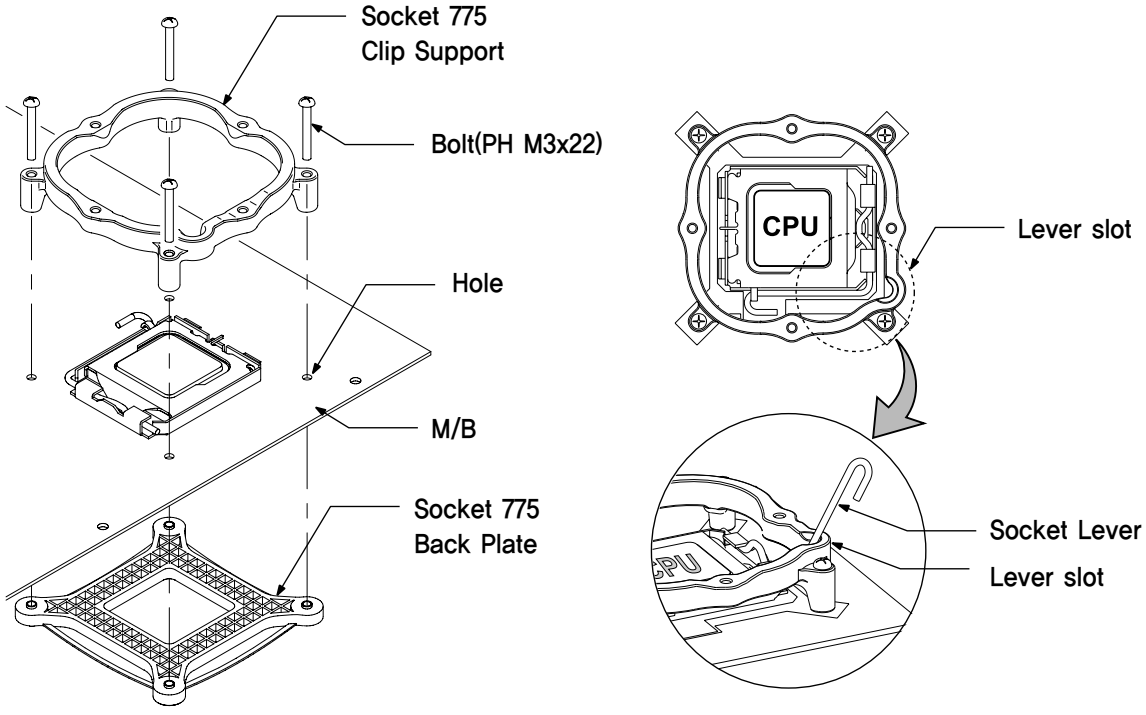
Place two Socket 478 Clip Supports on the notches of the Retention Guide.



Installation for Intel P4 Socket 478 Motherboards

▶ **For Intel Pentium 4 Socket 775 Motherboards**

Align the Socket 775 Clip Support and the Socket 775 Back Plate with the mounting holes on the motherboard and fasten with bolts (PH M3x22).



Installation for Intel P4 Socket 775 Motherboards

NOTE) The Lever Slot on the Clip Support should be properly oriented on the hinged side of the Socket Lever when installing.

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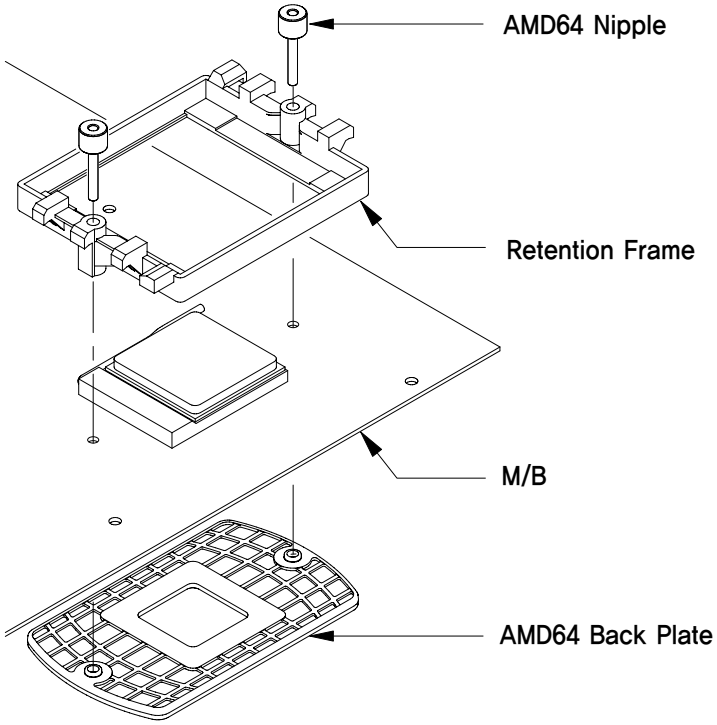
▶ **For AMD AMD64 Motherboards**

Insert the AMD64 Nipples into the holes on the Retention Frame and fasten the AMD64 Back Plate .



Installation for AMD AMD64 Socket 754/939/940 Motherboard

3) Installing the Rear-mount Thermal Blocks

※ **Caution)**

1) Motherboards with a Northbridge that has integrated video capability is not recommended. If such Northbridge is used, the Rear-mount Thermal Blocks MUST be installed.
2) Zalman Tech does not recommend using a motherboard with a fan on the Northbridge Cooler. If the fan is removed, the Rear-mount Thermal Blocks MUST be installed.
3) If the CPU has a higher Thermal Design Power (TDP) rating than an Intel Prescott or an AMD Athlon 64 3500+, the Heatpipe Northbridge Cooler and a Rear-mount Thermal Block MUST be installed to cool the Northbridge.
4) To use CPUs with a 100W or higher TDP rating, Rear-mount Thermal Blocks MUST be installed (one for each FET) on the backside of the motherboard in-line with each FET.
5) If interference occurs between components or any problems appear, visit Zalman's website for a list of recommended motherboards, and replace before installation. (www.zalman.co.kr/product/TNN500AF.html)
6) The Rear-mount Thermal Blocks are proprietary components of Zalman's TNN series cases. Do not use with other cases!

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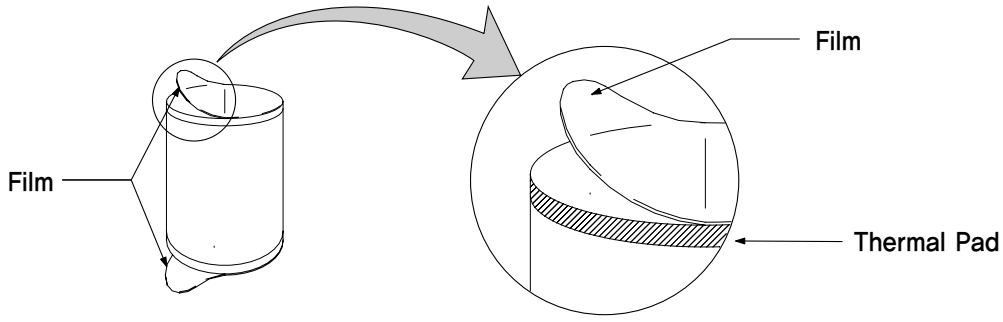
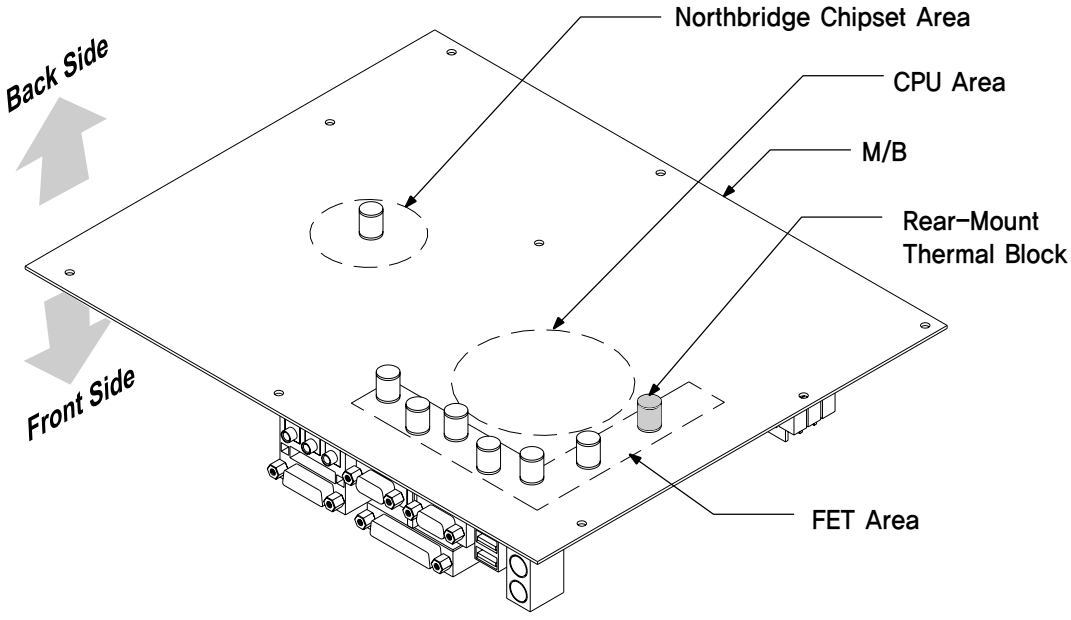
① Determine the points that correspond to the location of the FETs and Northbridge chipset on the back side of the motherboard.

② Clean the surface of the point where the block will be attached.

③ Peel off the Film from the Thermal Pad on both ends of the block.



④ Firmly attach the blocks on the determined points.



NOTES : 1) To prevent short circuiting the motherboard, avoid soldered points, and any exposed wiring or circuitry when installing the Rear-mount Thermal Blocks.

2) Thermal Pads lose adhesiveness after it has been used once. Try to attach it properly on the first attempt.

3) Do not touch the Thermal Pad with your hands.

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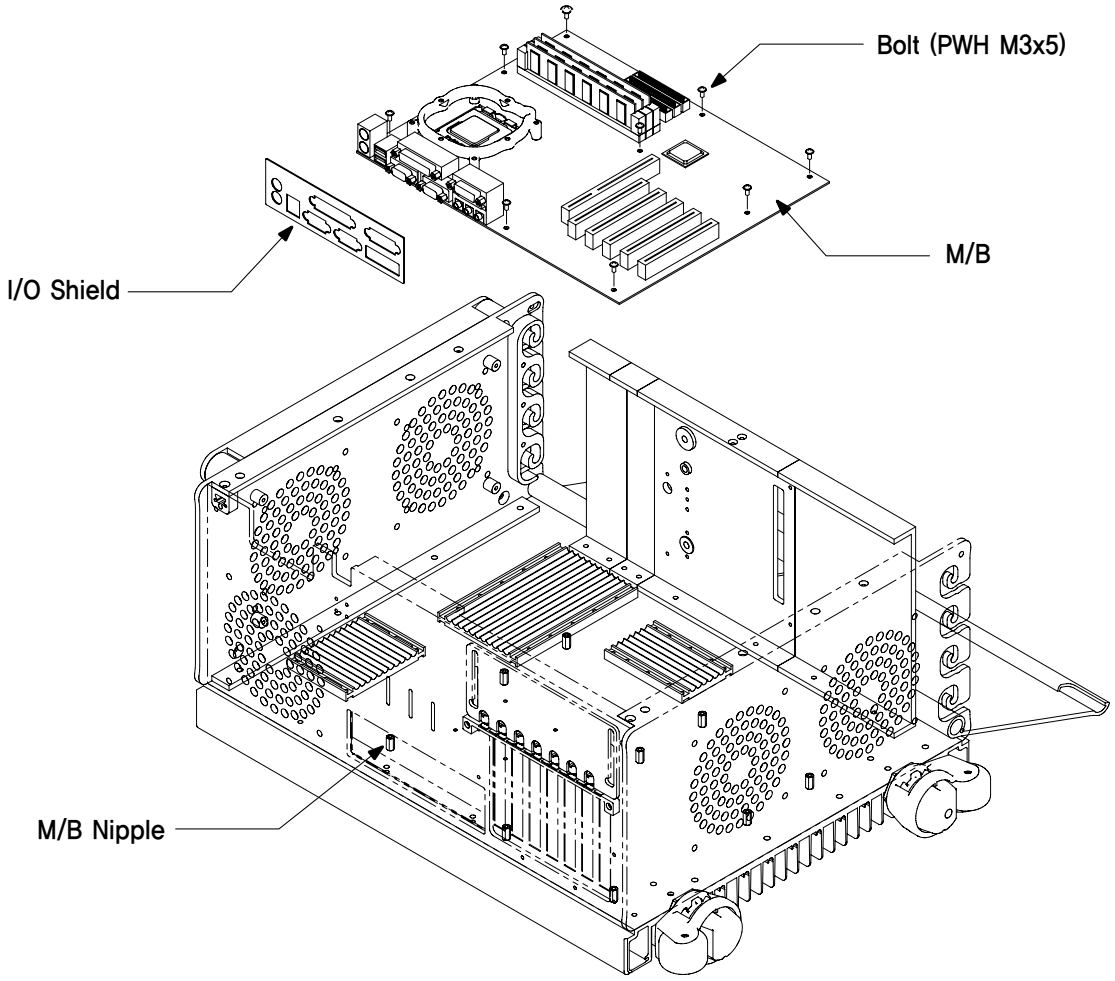
⑤ Install the motherboard using the bolts (PWH M3x5).



NOTES

1) To prevent short-circuiting the motherboard, nipples that are not required for motherboard installation must be removed first.
2) Fix the motherboard to the TNN using all of the motherboard's mounting holes.
3) Be careful to not let the Rear-mount Thermal Blocks fall off from the back of the motherboard.

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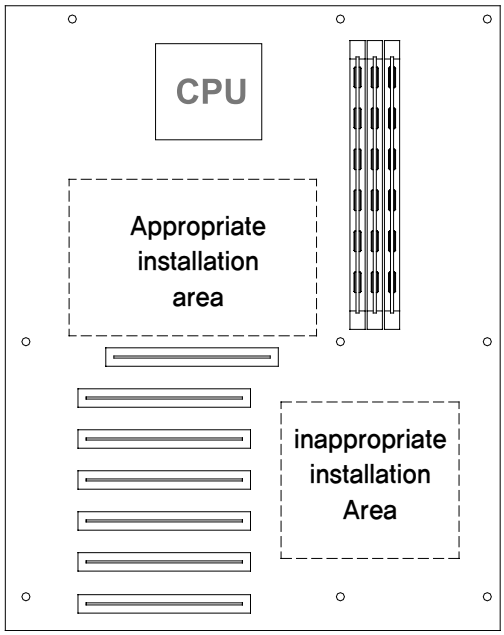
4) Installing the Heatpipe Northbridge Cooler

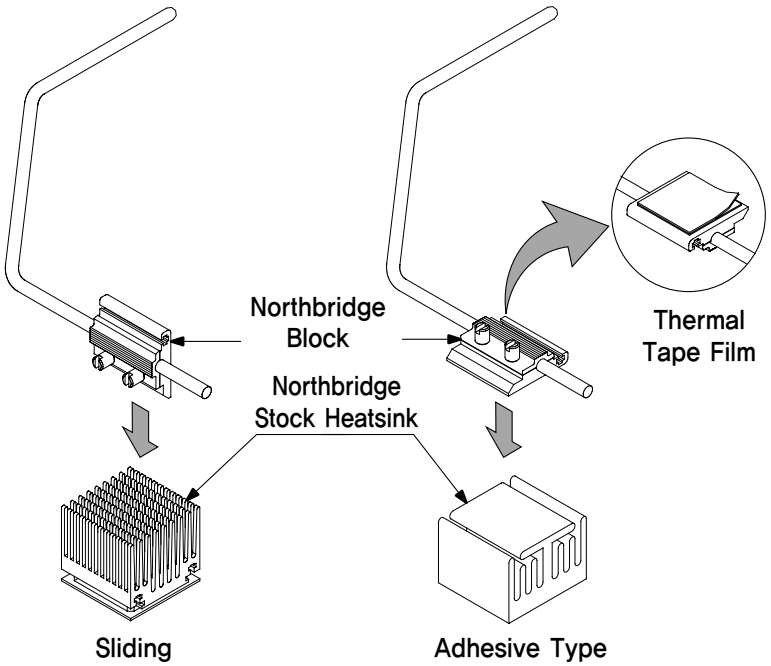


NOTES

1) The Heatpipe Northbridge Cooler can be installed only when the Northbridge is located in the appropriate area as shown in the diagram.
2) If the Northbridge chipset is located in the inappropriate area, it should be cooled with a Rear-mount Thermal Blocks(Refer to page 22).

If the CPU' s Thermal Design Power rating is lower than an AMD Athlon 64 3500+ or Intel Prescott, it is not necessary to install a Rear-mount Thermal Block for the Northbridge, for the Heatpipe Northbridge Cooler is sufficient.

① Check what type of Stock Northbridge Heatsink is on the motherboard and determine the method of Northbridge Block installation.



※ Notes on Installation of the Adhesive Type

1. The Thermal Tape must be adhered to the bottom of the Northbridge Block.
2. Remove the film from the Thermal Tape before adhering the Northbridge Block to the Stock Northbridge Heatsink.

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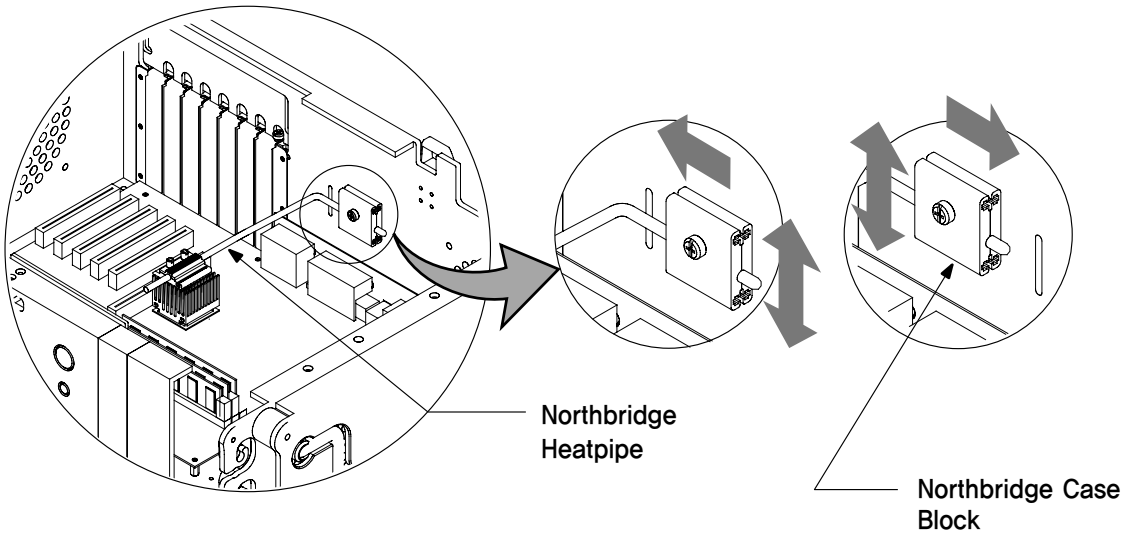
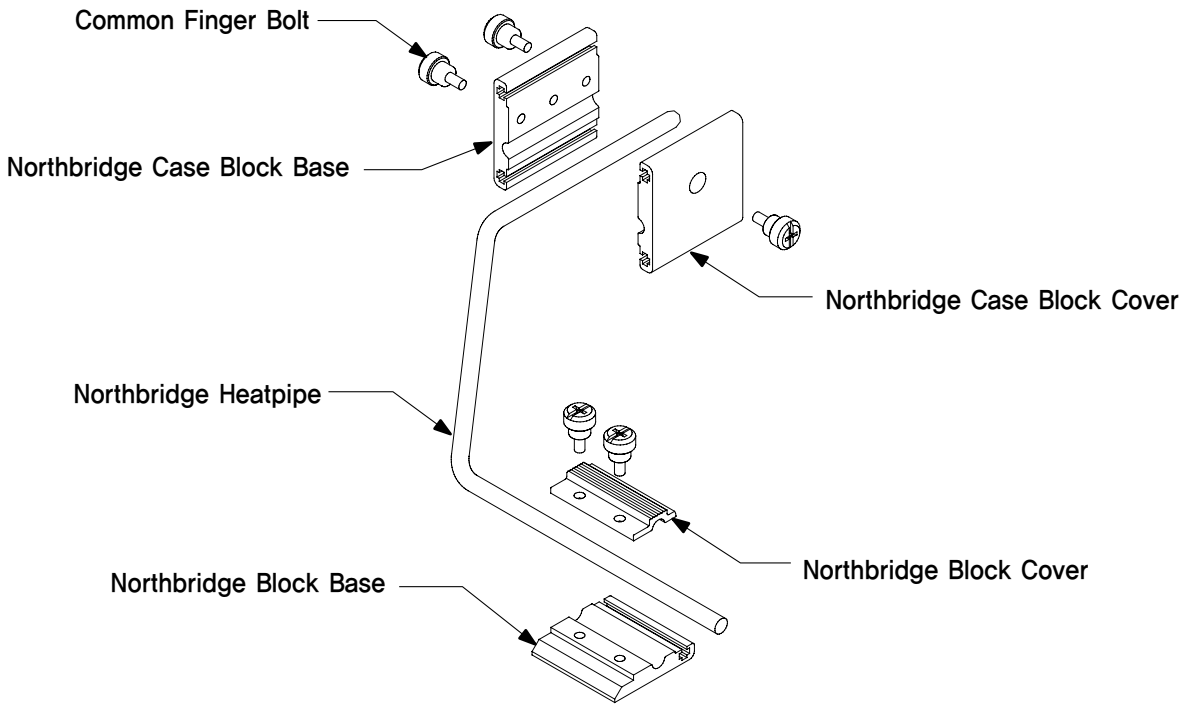
② Determine the installation point of the Northbridge Case Block and the Northbridge Heatpipe. The Position of the Northbridge Case Block can be adjusted horizontally as well as vertically.



The position of the Northbridge Case Block can be adjusted horizontally as well as vertically.

③ Assemble and install the Northbridge Cooler as shown in the Diagram.



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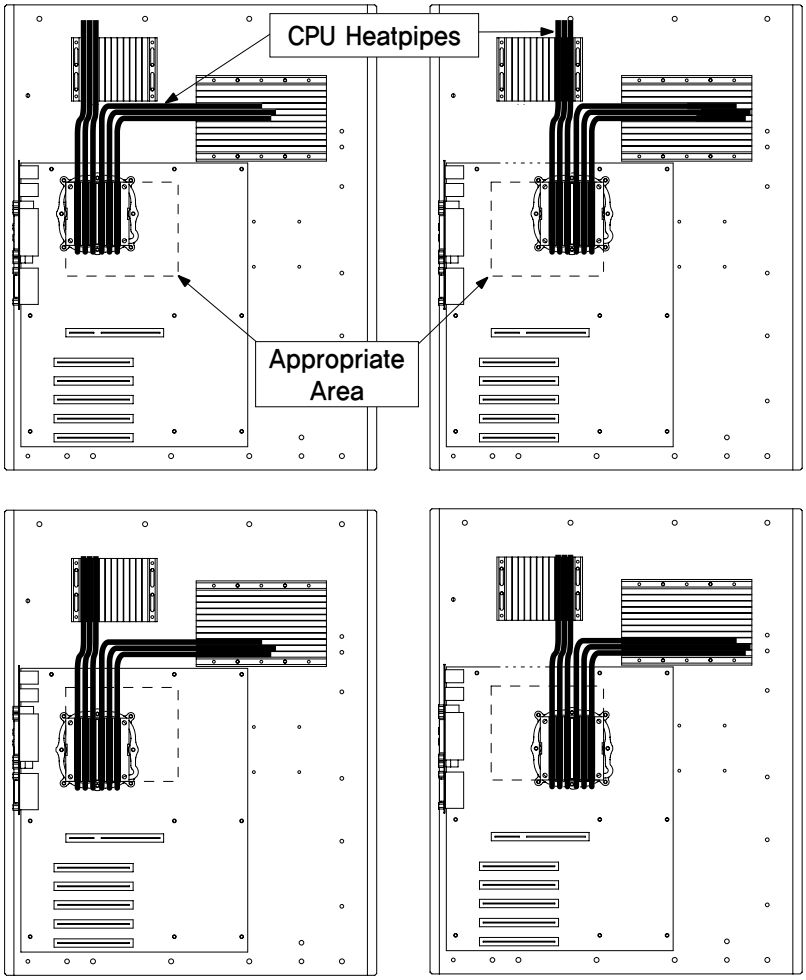
5) Installing the Heatpipe CPU Cooler

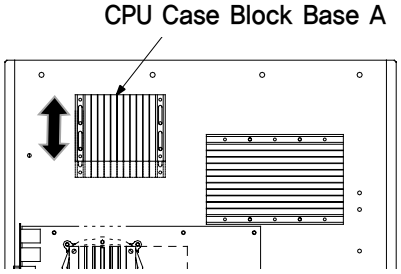
① Refer to the diagram below to check the appropriate layout of the CPU Heatpipes for each general location of the CPU.



NOTES

1) If the CPU Heatpipes interfere with certain components, turn the Heatpipes upside down or adjust the CPU Case Block Base A vertically and try installing again.

2) If the CPU is located beyond the appropriate area and the Cooler is deemed uninstallable, stop and replace the motherboard with a Zalman-recommended model (www.zalman.co.kr/product/TNN500AF.html)



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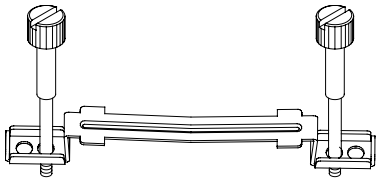
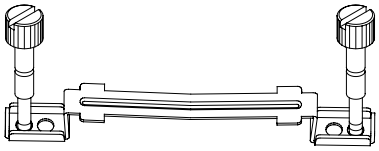
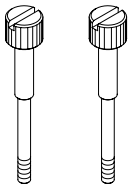
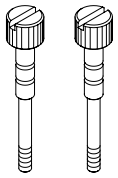
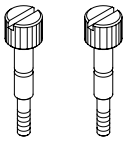
② Determine the appropriate CPU Finger Bolts & clip holes.

TYPE	Intel P4 Socket 478	Intel P4 Socket 775	AMD AMD64 Socket 754/939/940
Appropriate Installation Holes	 (Inner Holes)		 (Outer Holes)
Finger Bolts To Use	 Socket 478 Finger Bolts (M3x52)	 Socket 775 Finger Bolts (M3x49)	 AMD64 Finger Bolts (#6-32x40)

NOTES

1) Apply a generous quantity of thermal grease (1mm or 0.04 inches in height) on the CPU core, and install the CPU Block Base (gold colored).
2) Apply thermal grease on the grooves of the CPU Block Base and the CPU Case Block Base where the CPU Heatpipes come in contact.
3) The CPU Case Block Base already has thermal grease coated underneath, so it should not be taken off under normal circumstances.
4) Use a coin or a screwdriver to firmly tighten the CPU Finger Bolts.

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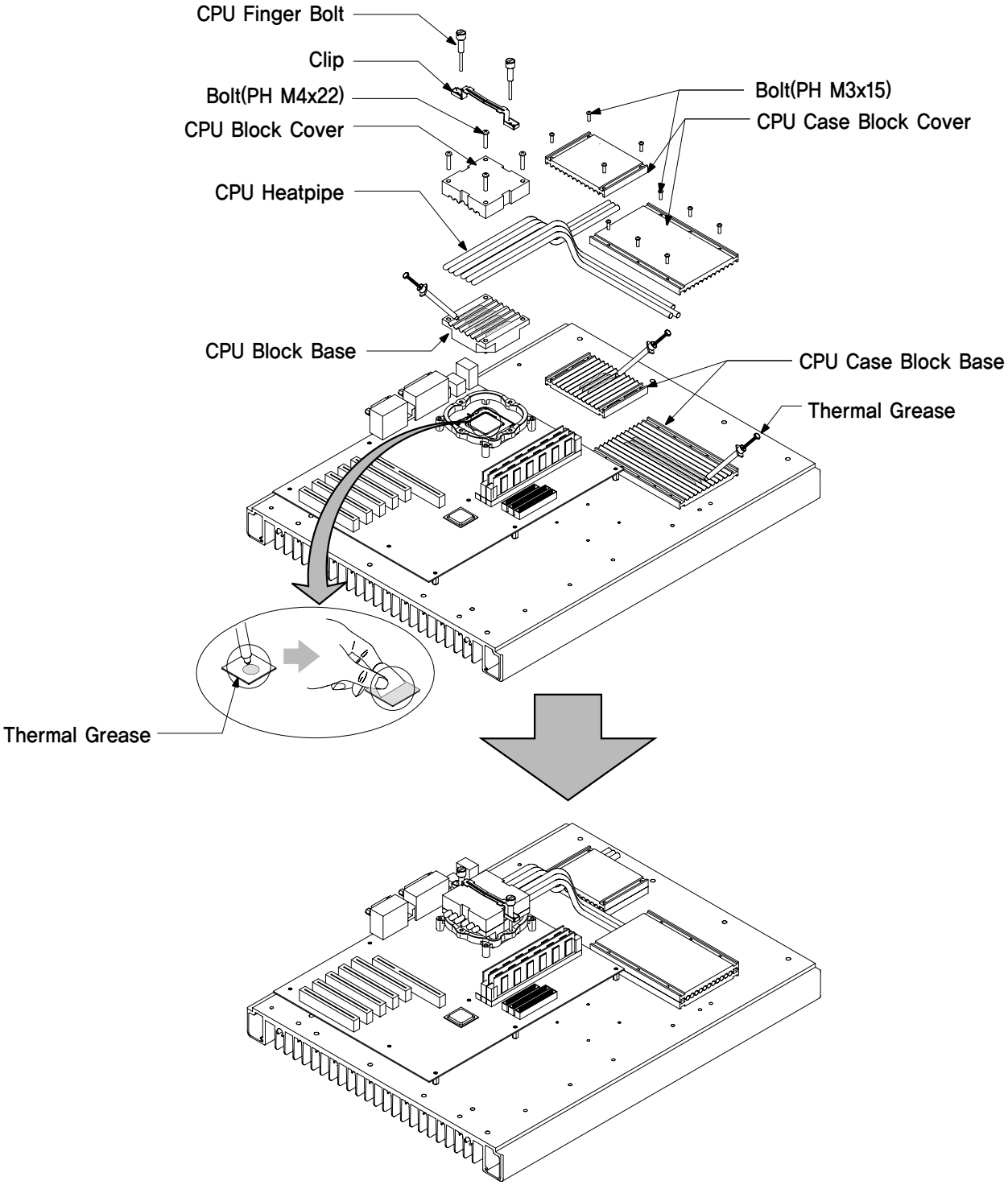
③ Install the Heatpipe CPU Cooler as shown in the diagram.



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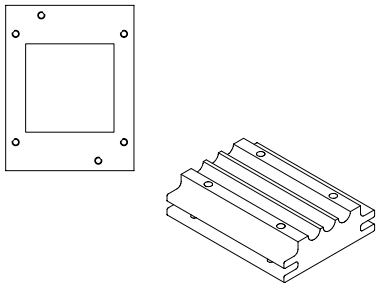
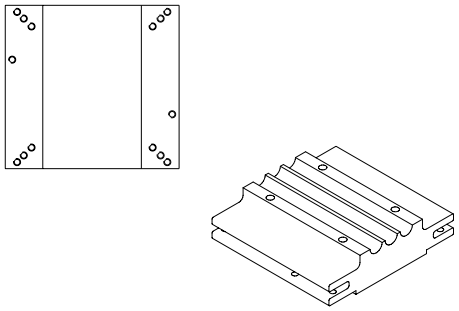
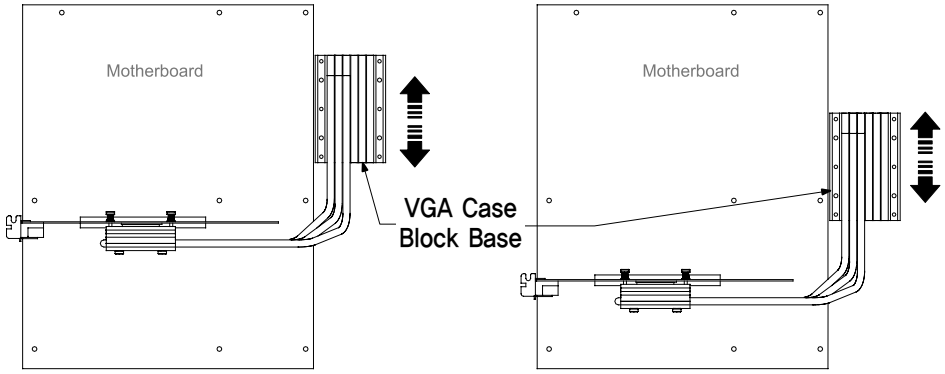
6) Installing the Heatpipe VGA Cooler

TYPE	VGA Block Base A	VGA Block Base B
Block		
ATI	ATI Radeon Series	–
NVIDIA	GeForce 4 Ti Series	FX 5900 Series
	GeForce 3 MX Series	GeForce 6800 Series
Matrox		Parhelia

NOTE) If the VGA card interferes with certain components of the case, stop and refer to the following website (www.zalman.co.kr/product/TNN500AF.html), and replace the VGA card with one that is recommended.

As you install the VGA card, move the VGA Case Block Base vertically as needed to accommodate the VGA card.



① Remove the Stock VGA Cooler on the VGA card and clean off the exposed contact surface completely.

NOTE) Be extremely careful when taking off the Stock VGA Cooler. Zalman is not responsible for any damages Due to user negligence during the Cooler's removal.

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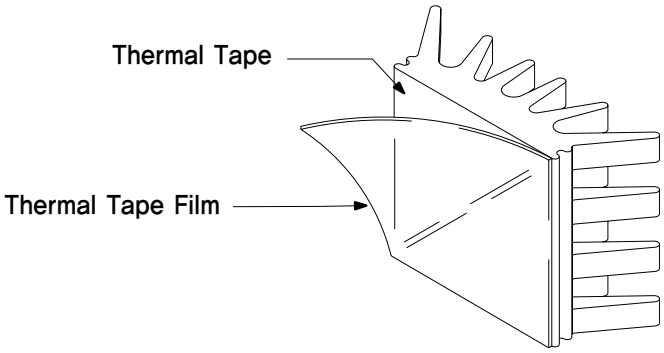
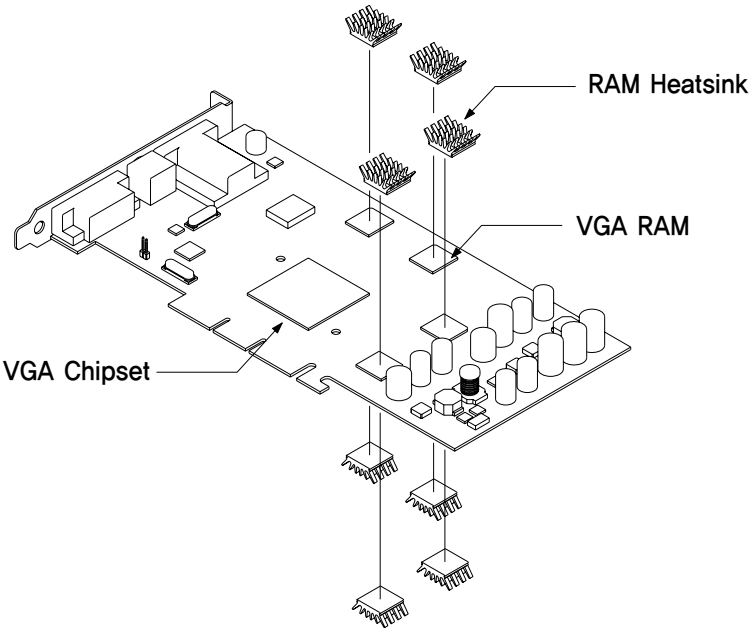
② Peel off the Film from the Thermal Tape on the bottom of the RAM Heatsinks.



NOTE : 1) The bending strength of the Thermal Tapes reaches 90% after 24 hours of curing. Do not put excessive force on the RAM heatsinks during this period.

2) Avoid getting grease or any kind of stain on the surface of the Thermal Tape. The Thermal Tape may not stick. Clean the surface of the RAM with acetone or alcohol before attaching.

③ Stick the RAM Heatsinks onto the VGA RAM chips. Press the RAM Heatsinks firmly with your finger for proper adhesion.



1) If there are more than 8 VGA RAM chips on your VGA card, purchase additional RAM Heatsinks (ZM-RHS1).

2) Thermal Tape loses adhesiveness after it has been used once. Thermal Tape cannot be reused after it has been detached from a surface. If you need more, purchase it separately.

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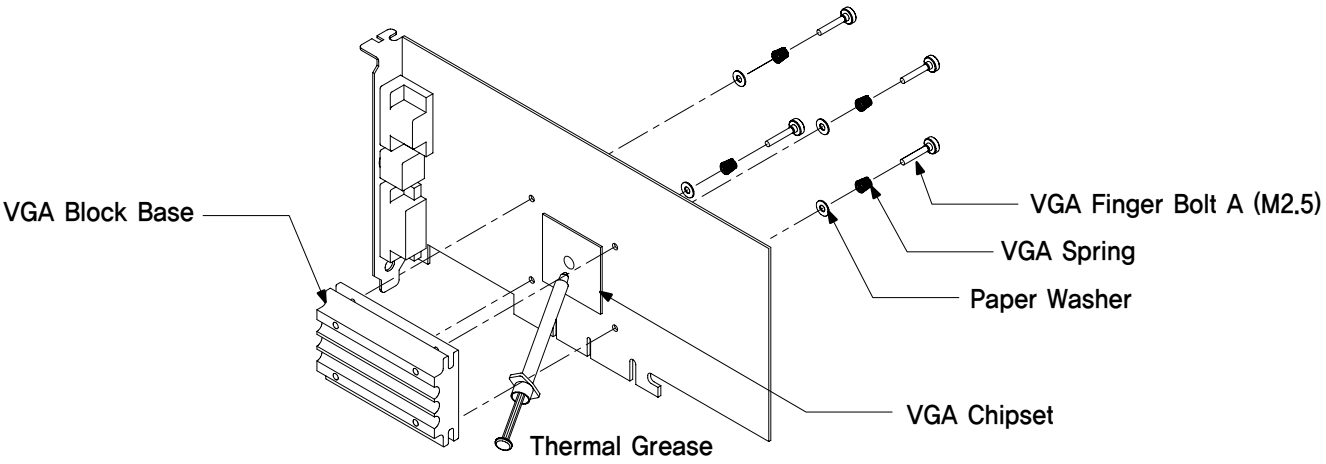
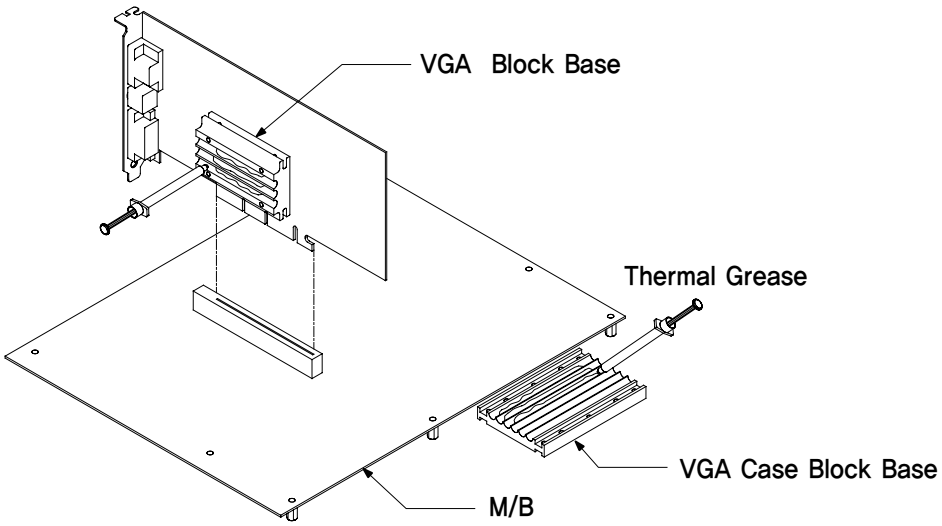
④ Apply a thin layer of thermal grease on the VGA chipset.

NOTE) Most VGA chipsets on the VGA card have a concave curvature towards the middle and need more thermal grease at the center.

⑤ Make sure the VGA Block Base is level and firmly installed onto the VGA chipset using the Paper Washers, the VGA springs, and the VGA Finger Bolts A(M2.5).



⑥ Apply thermal grease evenly onto the grooves on the VGA Case Block Base that come in contact with the VGA Heatpipes, and install the VGA card on the motherboard.



NOTE) The VGA Case Block Base already has thermal grease coated underneath, and should not be taken off under normal circumstances.

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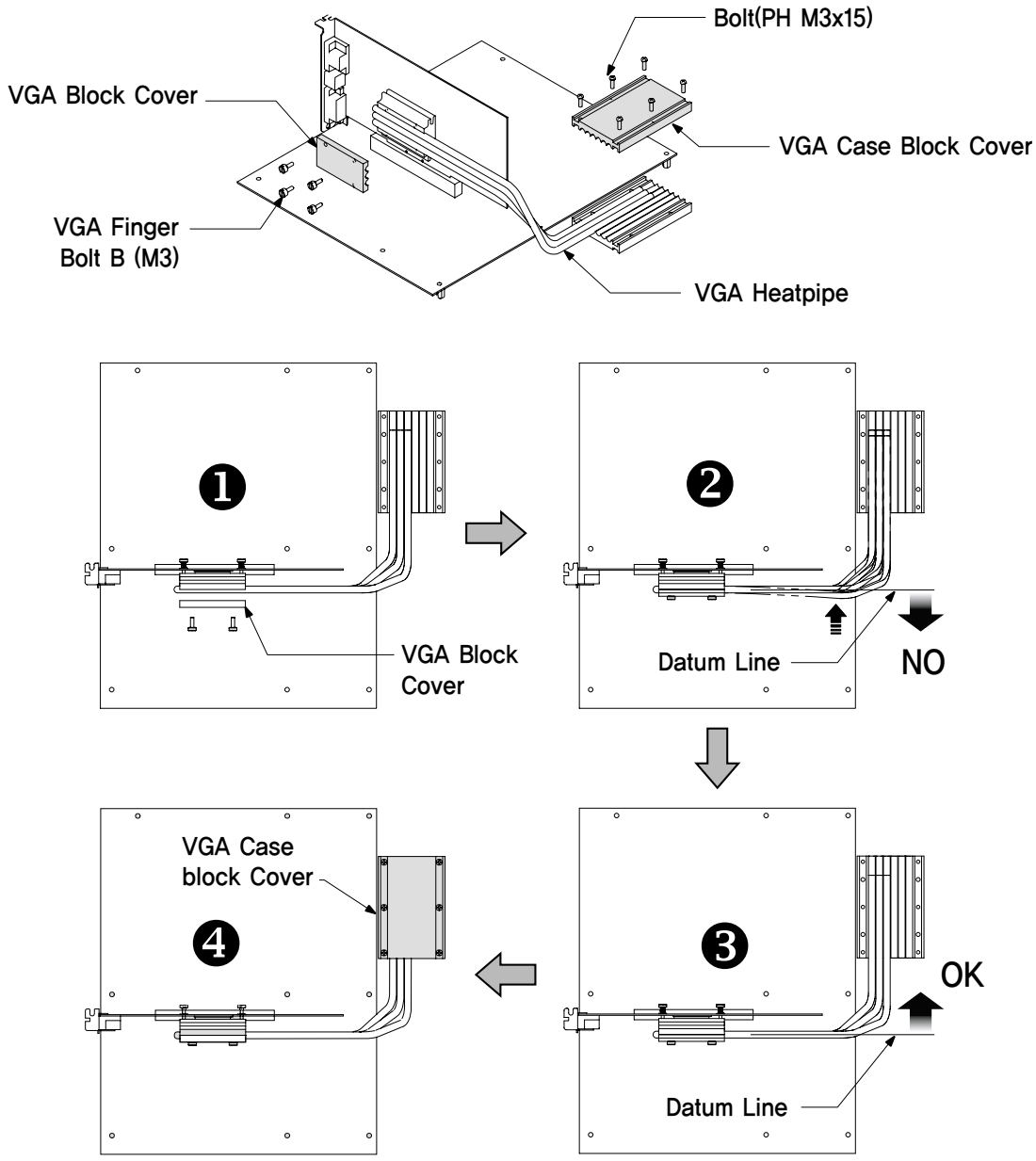
⑦ Install the VGA Heatpipes in sequence and fix the Block Cover over them using the VGA Finger Bolts B(M3). Then, fix the VGA Case Block Cover using bolts (PH M3x15).



NOTES

1) There are many types of VGA cards and the VGA Heatpipes may not fit the grooves on the VGA Case Block very well. In this case, the user needs to modify the VGA Heatpipes to fit the grooves.
2) If the VGA Heatpipes must bend below the datum line, the VGA Heatpipes will not function properly and the VGA chipset may get damaged. Check if this is the case before proceeding.

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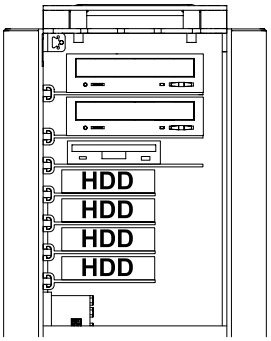
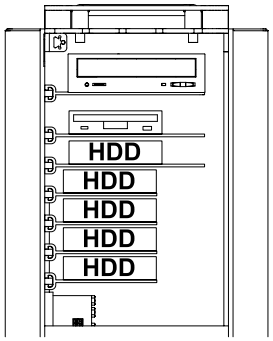
7) Installing the ODD/FDD/HDD

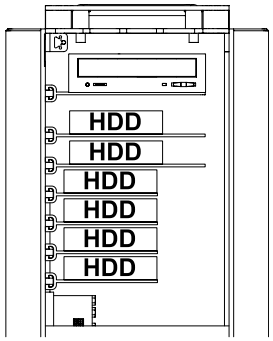
① The ODD/HDD/FDD can be installed as shown in the diagrams below.



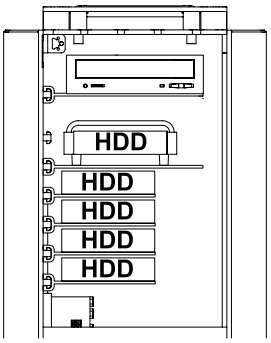
❶ ODD 2EA
FDD 1EA
HDD 4EA



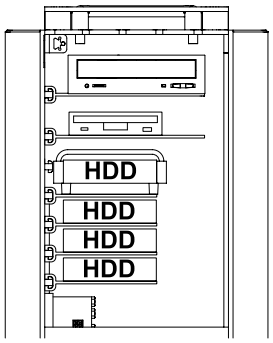
❷ ODD 1EA
FDD 1EA
HDD 5EA



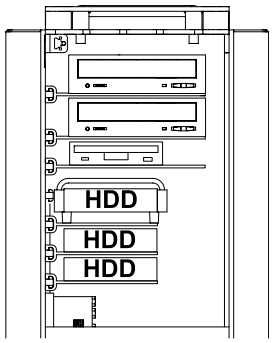
❸ ODD 1EA
HDD 6EA



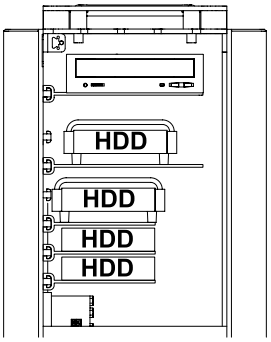
❹ ODD 1EA
HDD Cooler 1EA
HDD 4EA



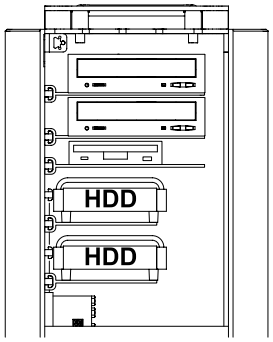
❺ ODD 1EA
FDD 1EA
HDD Cooler 1EA
HDD 3EA



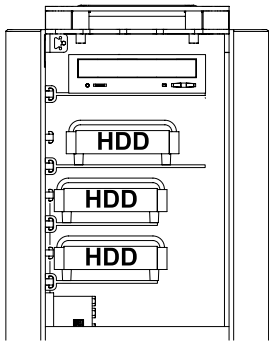
❻ ODD 2EA
FDD 1EA
HDD Cooler 1EA
HDD 2EA



❼ ODD 1EA
HDD Cooler 2EA
HDD 2EA



❽ ODD 2EA
FDD 1EA
HDD Cooler 2EA



❾ ODD 1EA
HDD Cooler 3EA

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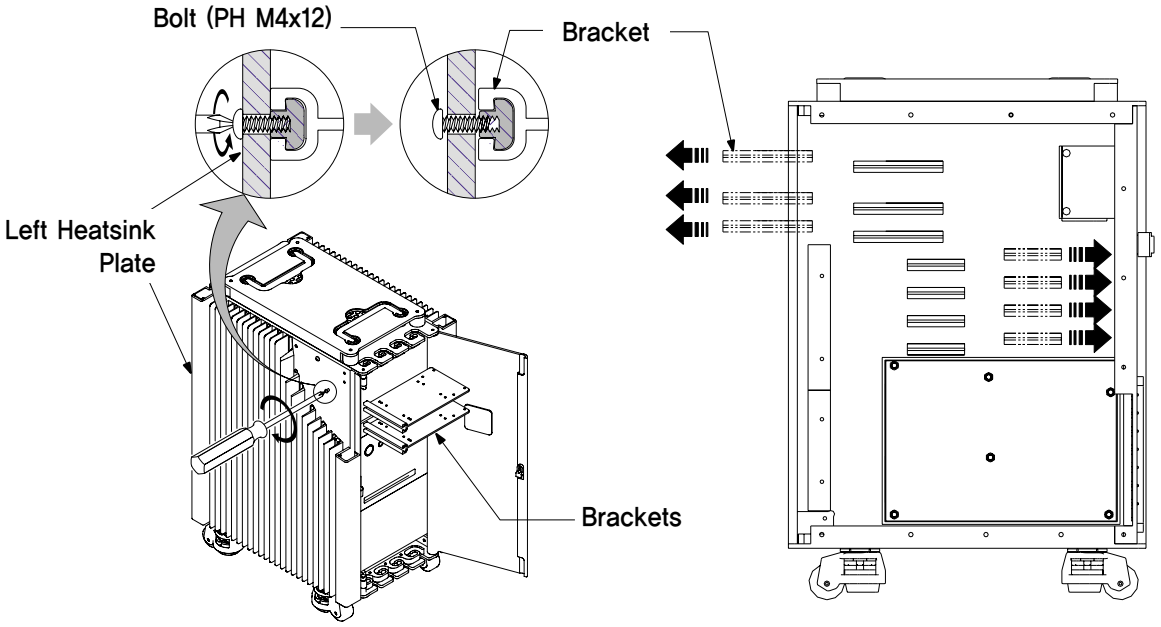
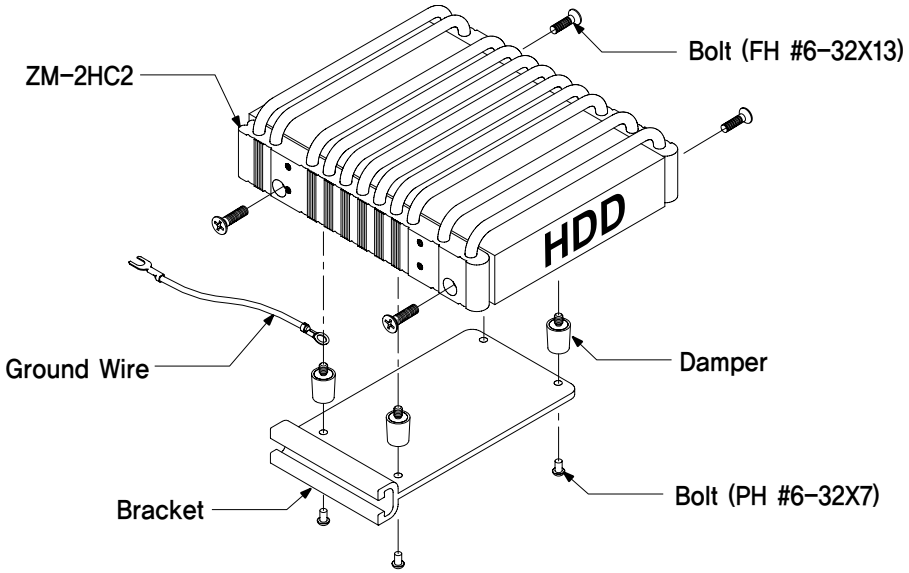
② Loosen the bolts (PH M4x12) on the left heatsink slightly and remove the ODD/FDD/HDD Brackets.



③ Install the Heatpipe HDD Cooler as shown in the diagram.



NOTES) The ground wire MUST be connected to Both the HDD and the Damper as shown.

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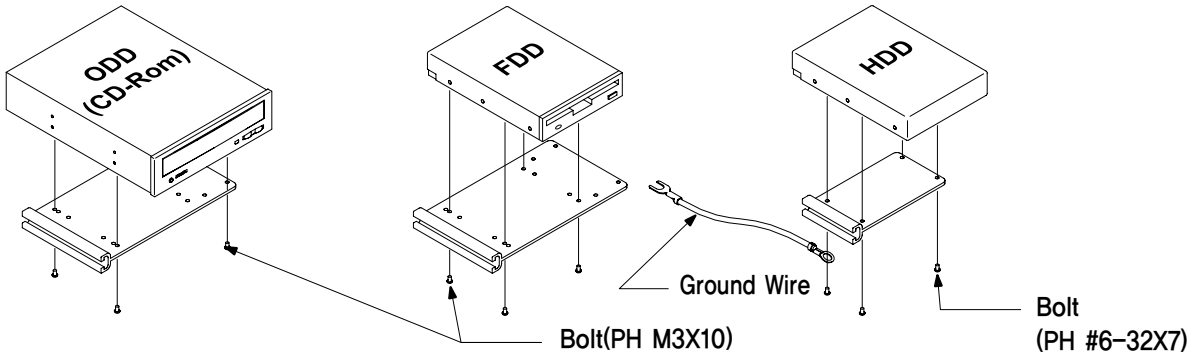
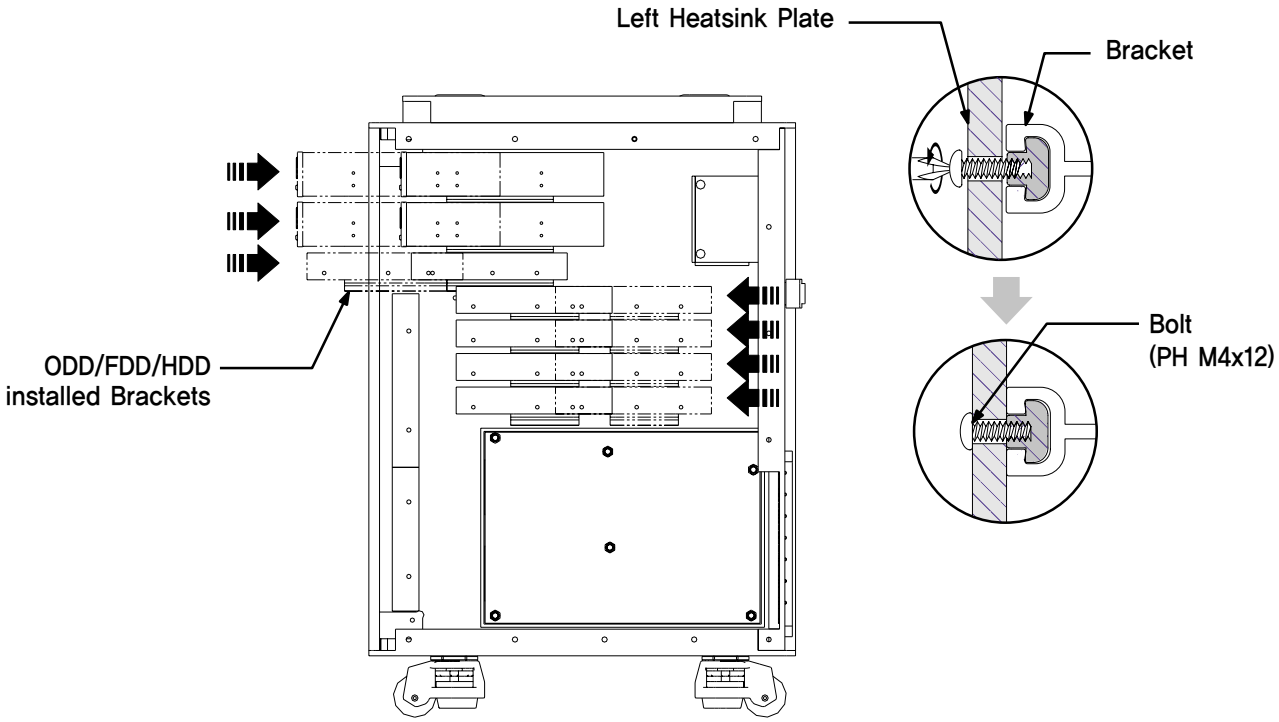
④ Install the ODD/FDD/HDD on the Brackets.



NOTE) Remember to connect the Ground Wire to the HDD.

⑤ Insert the ODD/FDD/HDD installed Brackets in the direction shown in the diagram, and re-fasten the Bracket fixing bolts (PH M4x12) on the Left Heatsink Plate completely.



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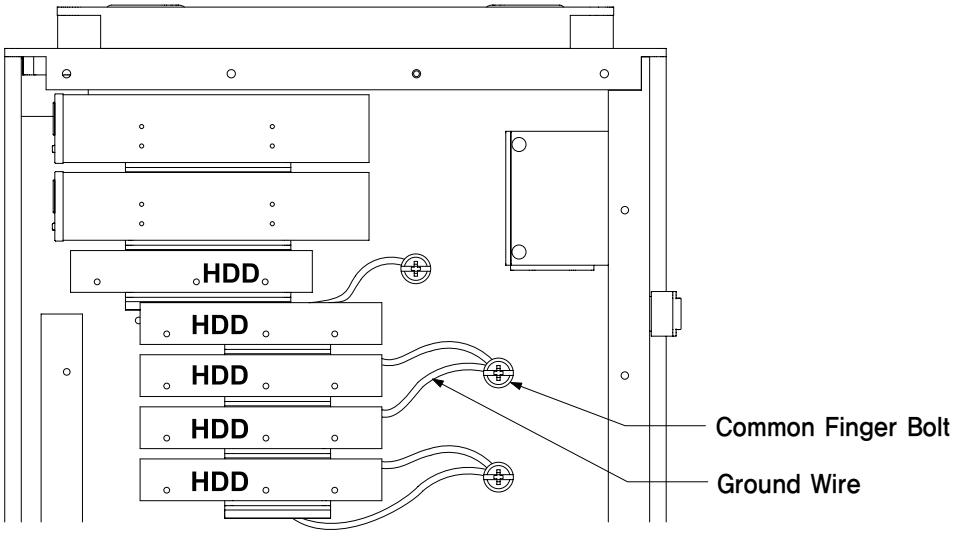
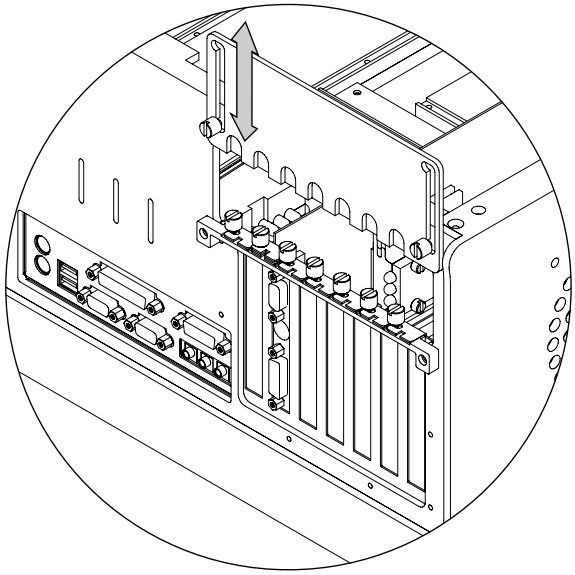
⑥ Connect the Ground Wire to the right heatsink.



8) Installing PCI Cards

Insert the PCI cards into the PCI slots and fix them firmly in place using the card fixing bolts.



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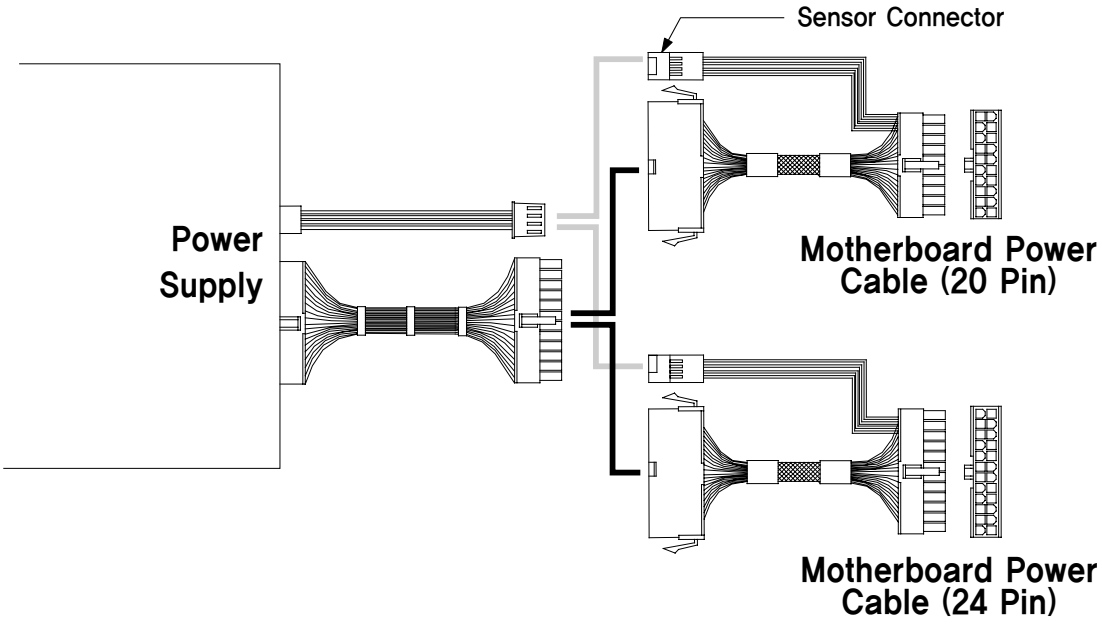
9) Connecting the Power & Data Cables

① Check whether the power connector on the motherboard is a 24 pin or 20 pin type connector and connect the appropriate Motherboard Power Cable.



② Connect the various power and data cables as needed.

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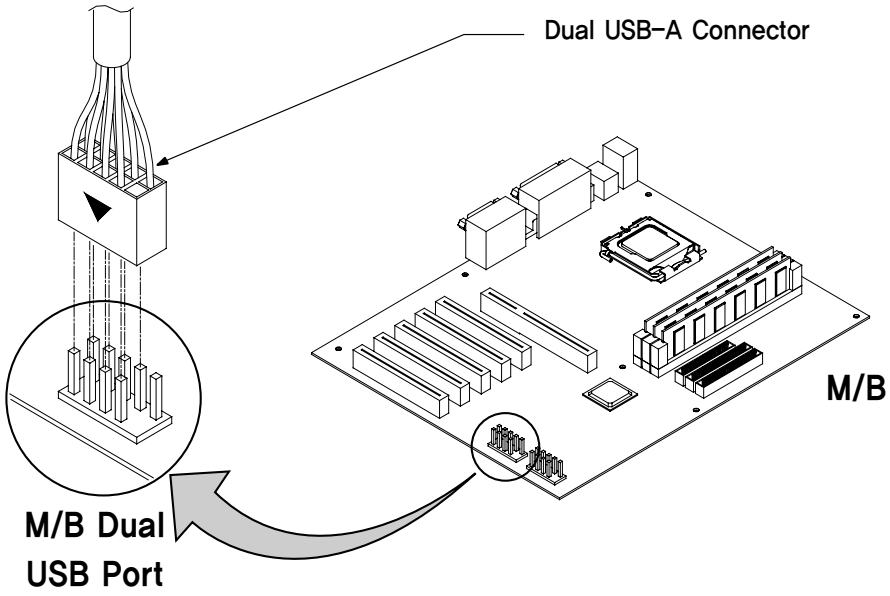
10) Connecting the Remote Control receiver and USB Cables

▶ Two Available Dual USB Port on the Motherboard

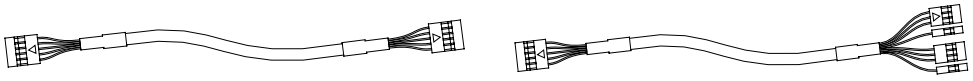
① **To Use the Remote Control Function**

- Plug the Dual USB-A Connector into the Dual USB Port on the motherboard(M/B).



Note)

1) As shown below, there are two types of USB cables (USB-A & USB-B).
Please connect the cables according to the instructions in this guide.



Dual USB-A Cable　　Dual USB-B Cable

2) Verify the location and the layout of the USB headers from the motherboard manual.

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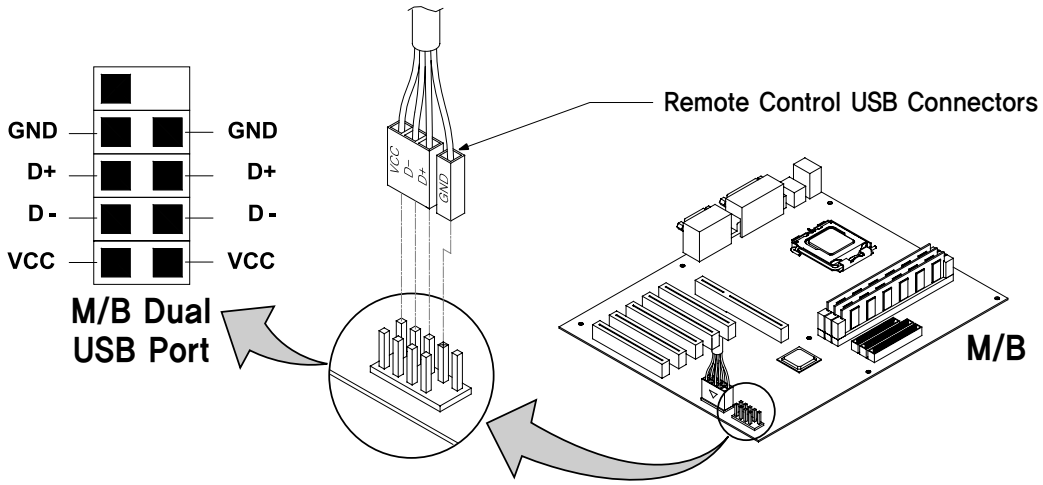
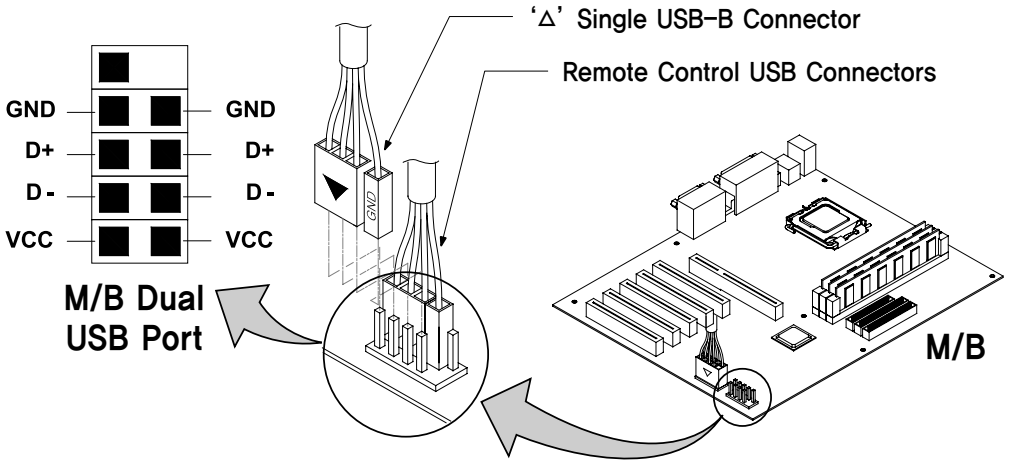
- Plug the Remote Control USB Connectors into the Dual USB Port on the motherboard.



Color codes

VCC : red (yellow), D- : white (orange), D+ : green (blue), GND : black

- Next to where the Remote Control USB Connectors have been connected, on the same Dual USB Port, connect the Single USB-B Connectors that have the '△' marking.



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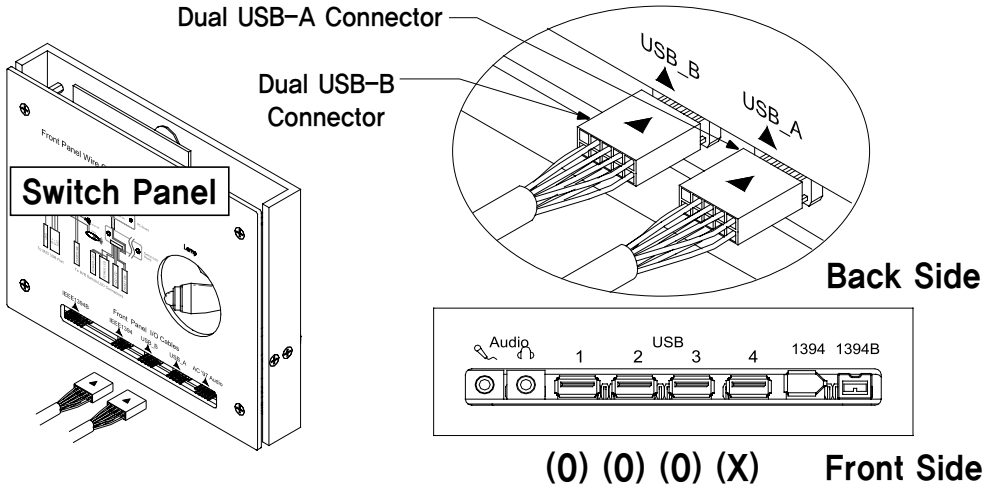
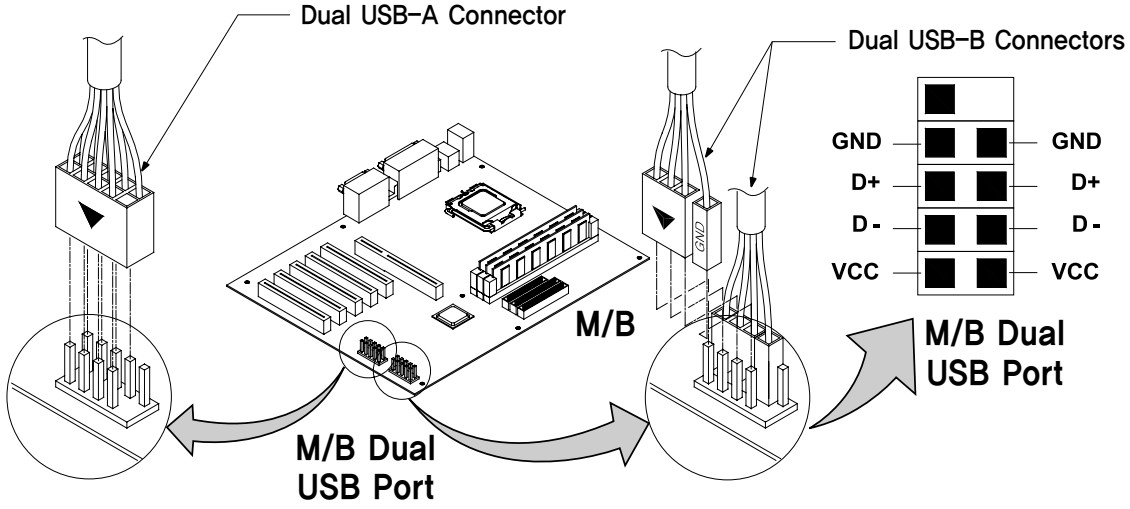
- Plug in the Dual USB-A and USB-B Connectors into their respective ports on the back of the Switch Panel.



USB ports #1 through #3 (see diagram) can be used in this configuration.

② To Sacrifice the Remote Control Function

- Plug the Dual USB-A Connector and the Dual USB-B Connectors into each of the Dual USB Ports on the motherboard.



1) Verify the location and the layout of the USB headers from the motherboard manual.
2) Color codes
VCC : red (yellow), D- : white (orange), D+ : green (blue), GND : black

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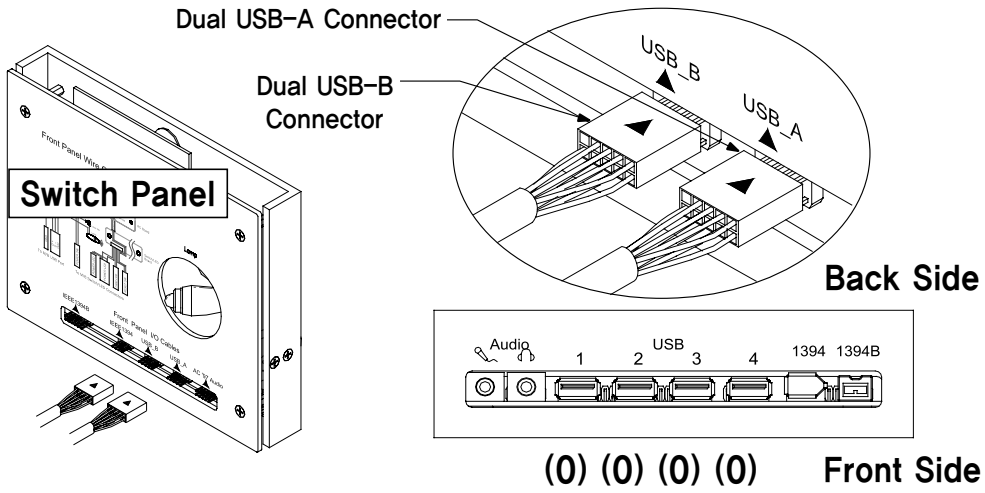
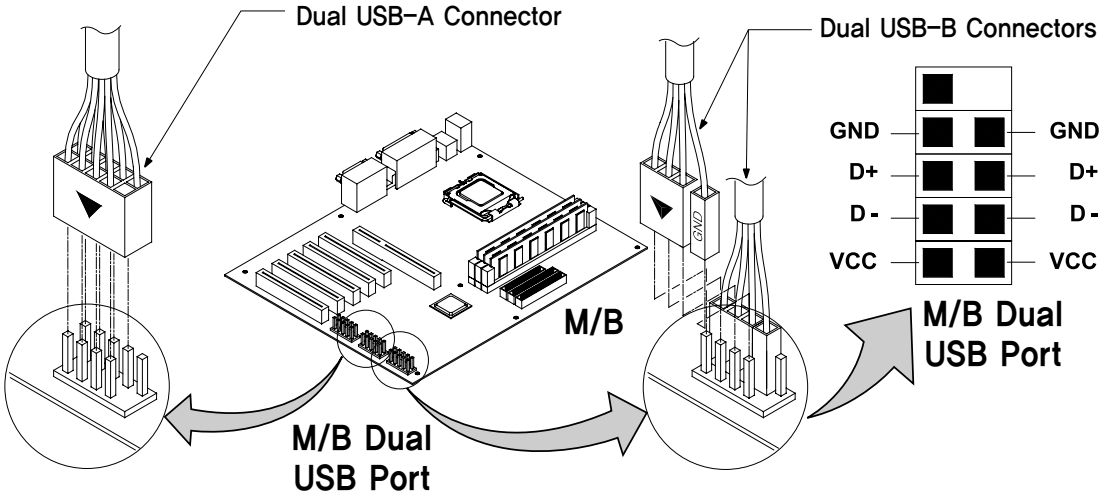
- Plug in the Dual USB-A and USB-B Connectors into their respective ports on the back of the Switch Panel.



All of the USB ports (see diagram) can be used in this configuration.

▶ Three Available Dual USB Port on the Motherboard

① Plug the Dual USB-A Connector and the Dual USB-B Connectors into each of the Dual USB Ports on the motherboard.



1) Verify the location and the layout of the USB headers from the motherboard manual.
2) **Color codes :** VCC : red (yellow), D- : white (orange), D+ : green (blue), GND : black

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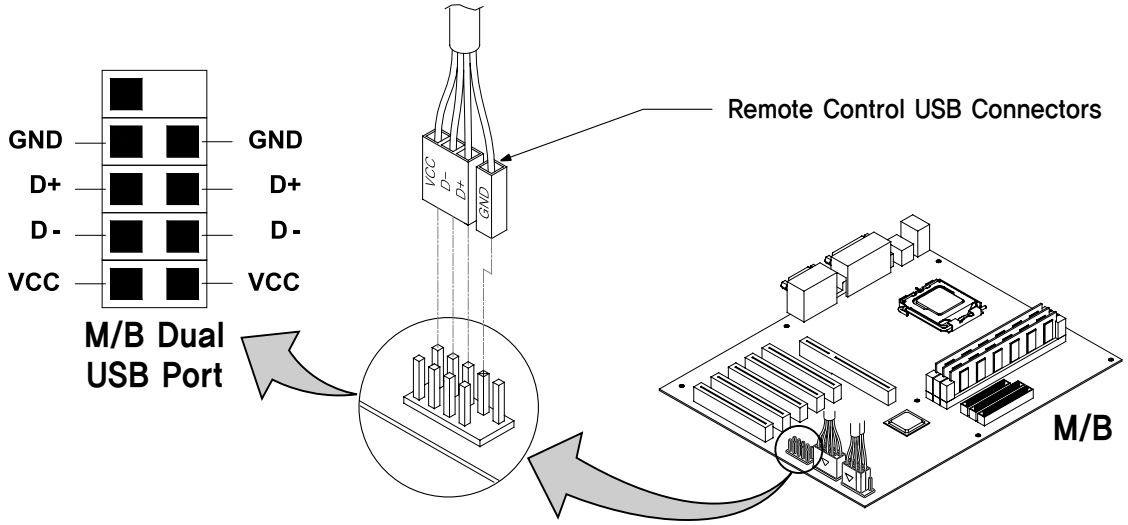
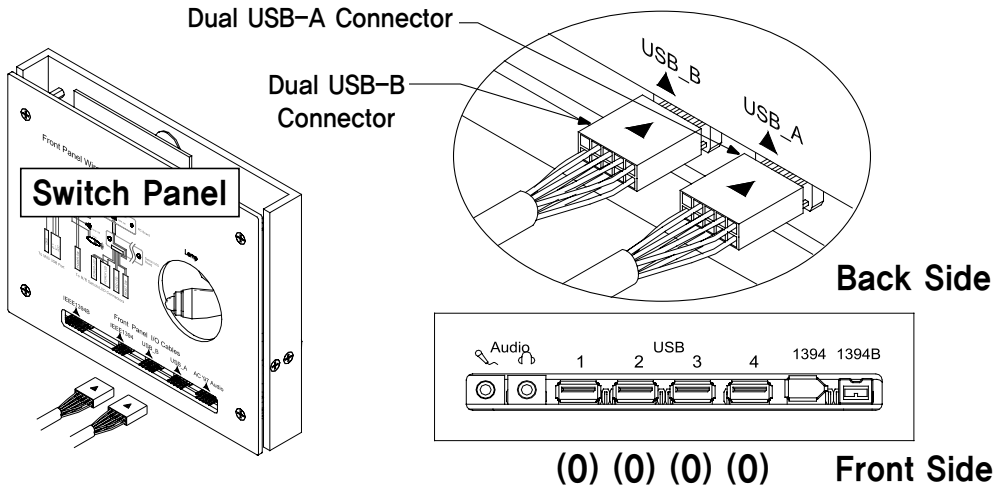
② In the remaining Dual USB Port on the motherboard, connect the Remote Control USB Connectors.



③ Plug in the Dual USB-A and USB-B Connectors into their respective ports on the back of the Switch Panel.



All of the USB ports (see diagram) can be used in this configuration.

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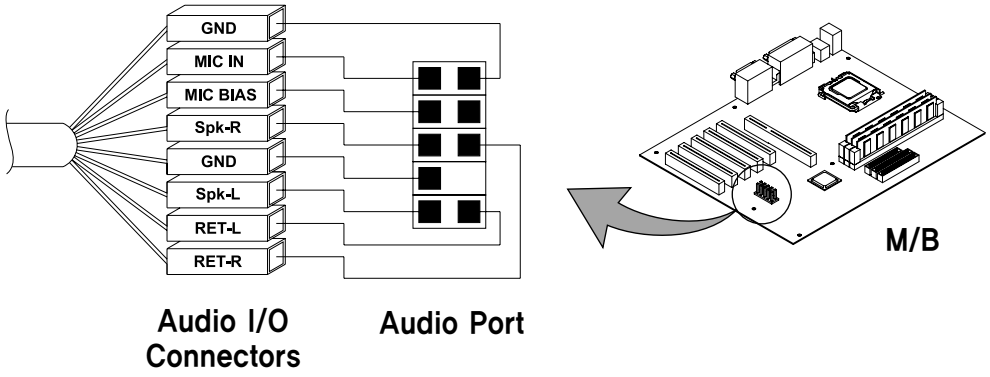
11) Connecting Audio I/O, IEEE1394, and IEEE1394B Cables

① **Plug the Audio I/O Connectors onto the Audio Port on the motherboard.**

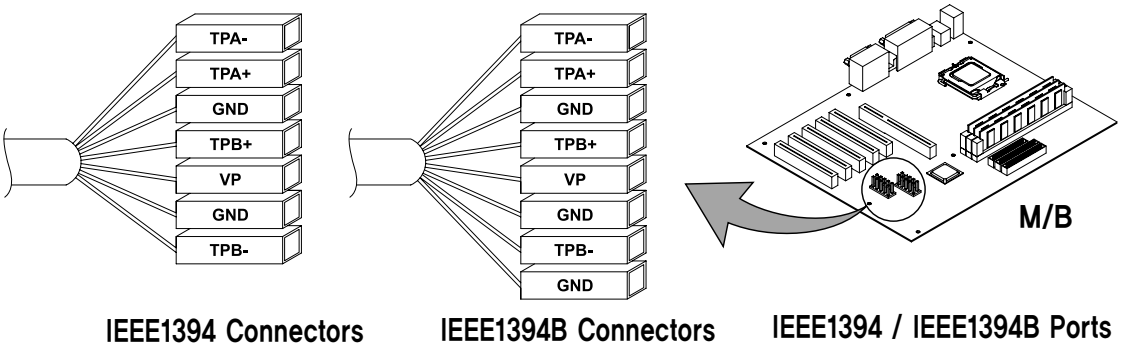
Caution : The audio headers arrangement may differ among motherboards.
Check the motherboard's manual for correct header arrangement First.



Color codes :
GND : Black, MIC : Orange, MIC BIAS : Red, Spk-R : Green,
Spk-L : Yellow, RET-L : Brown, RET-R : Blue

② Plug the IEEE1394 / IEEE1394B Connectors onto the IEEE1394 / IEEE1394B Port on the motherboard.

Caution : The IEEE1394 / IEEE1394B headers arrangement may differ among motherboards.
Check the manual for correct header arrangement first.



Color codes :
TPA - : Green, TPA + : Red, GND : Black, VP : White,
TAPB + : Orange, TAPB - : Blue

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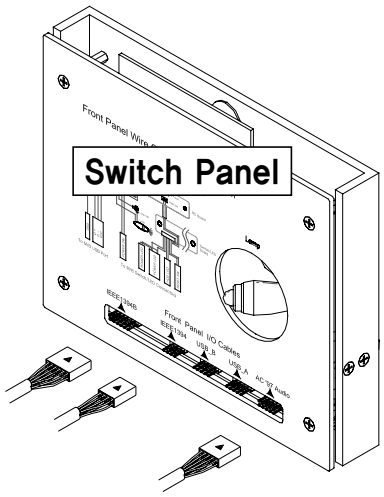
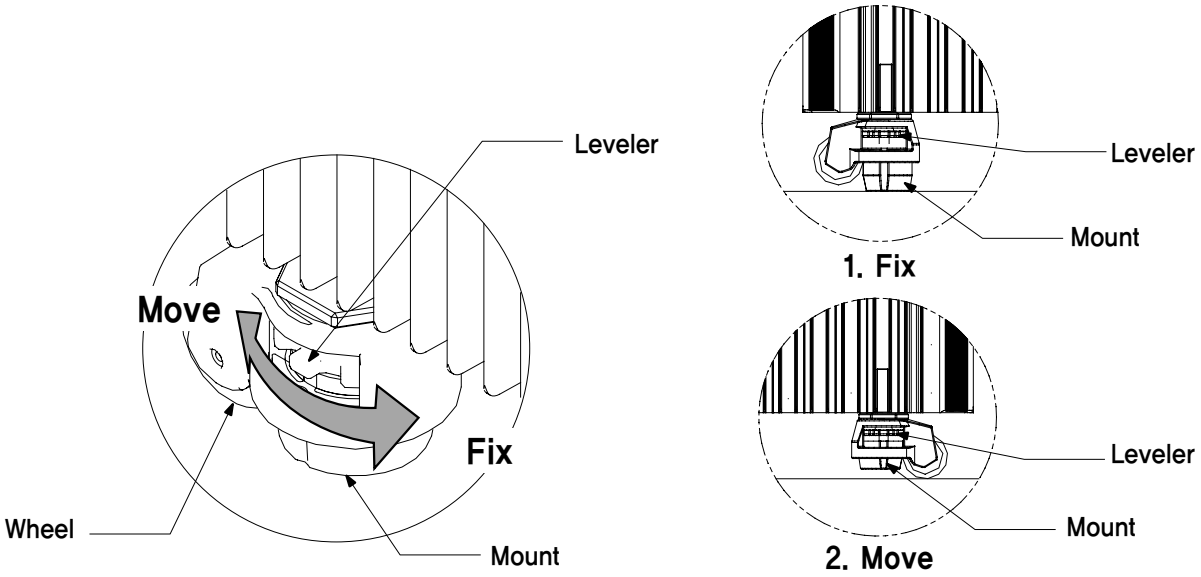
③ Plug the other end of the audio I/O, IEEE1394 & 1394B cables into the back side of the Switch Panel. Note the arrows for orientation.



12) Use Casters

The Casters' level can be adjusted to either fix the TNN500AF in place or make it move freely.



If the TNN500AF cannot be installed on a flat surface, the leveler can be used to make it level; doing so also reduces noise from vibration.

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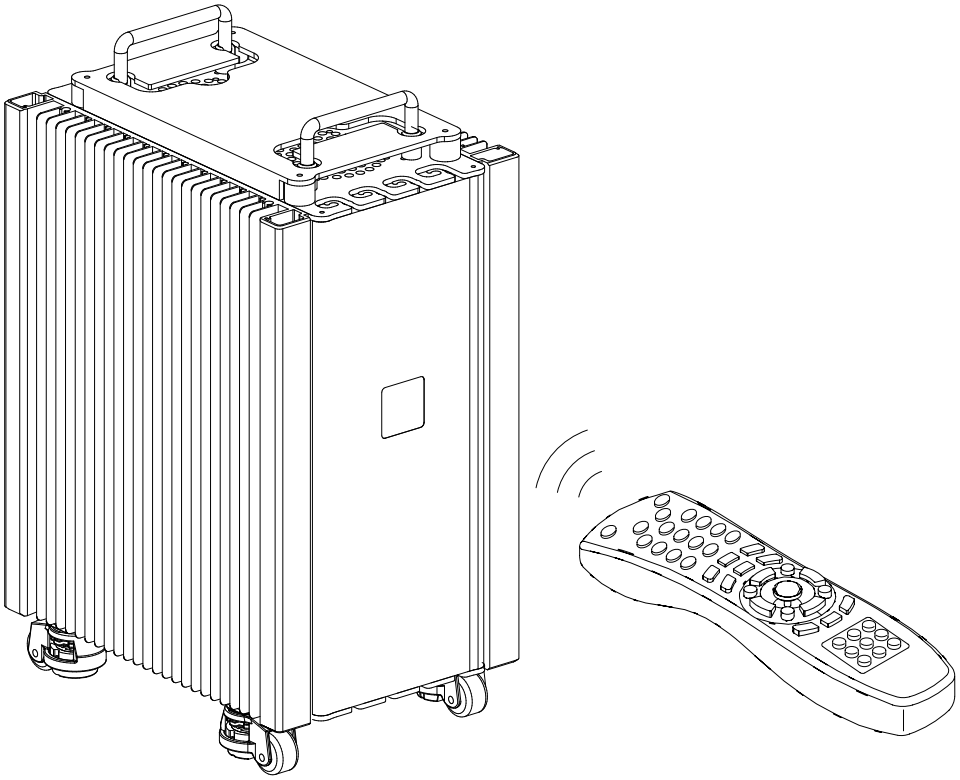
13) Using the Remote Control

Refer to the iMON & Multi-Median User's Guide for Details.



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